

7-8 EDWARD VII.

SESSIONAL PAPER No. 25b

A. 1908

DEPARTMENT OF THE INTERIOR

ANNUAL REPORT

OF THE

TOPOGRAPHICAL SURVEYS
BRANCH

1906-1907

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REPORT

OF THE

SURVEYOR GENERAL OF DOMINION LANDS

1906-1907

DEPARTMENT OF THE INTERIOR,
TOPOGRAPHICAL SURVEYS BRANCH,
OTTAWA, September 16, 1907.

The Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the following report on the operations of the Topographical Surveys Branch for last year.

Heretofore the annual report has been for the fiscal year which ended June 30. Owing to the fact that June 30 came in the middle of the surveying season and the consequent difficulty of estimating the surveys made to that date, it has been the practice to make the statement and estimates of surveys in the field for the calendar year. Now that the end of the fiscal year has been changed to March 31, the fiscal year and the surveying season correspond fairly well, and it will be possible in future to have all statements for the fiscal year. In order, however, to bring this report to date, it is being made to cover the surveys for fifteen months, from January 1, 1906, to March 31, 1907.

SURVEYS FOR THE FIFTEEN MONTHS ENDING MARCH 31, 1907.

During this period, one hundred and forty-nine whole townships and eleven fractional townships were completely subdivided, while one hundred and forty-two townships were partially subdivided. Also, twenty-nine whole townships and one fractional township were completely re-surveyed while one hundred and twenty-three townships were partially re-surveyed. Sixty-four survey parties were employed, fifty-five being engaged on township surveys and nine on other surveys. Of the parties organized, thirty-five were paid by the day and twenty-nine were working under contract. Four of the parties under daily pay were located in Manitoba, eight in Saskatchewan, eight in Alberta, five in British Columbia, one in the Northwest Territories, and nine were part of the time in one province and part in another. Six contractors were located in Manitoba, seven in Saskatchewan, thirteen in Alberta, one in British Columbia and two part of the time in one province and part in another.

The contract surveys were inspected by Messrs. Geo. McMillan, P. R. A. Belanger, G. J. Lonergan, L. E. Fontaine, G. A. Grover and E. W. Hubbell, but with the exception of Mr. McMillan, their time was not entirely occupied with this work. The number of contracts examined was twenty-four.

TOWNSHIP SURVEYS.

The reports of the surveyors in charge of parties are given as appendices 13 to 45 inclusive; a perusal of these reports shows many instances of hard work and devotion to duty.

An illustration of what surveyors may have to contend with is afforded by the experience of Mr. J. N. Wallace, who established the fourteenth base line from the third to the second meridian, and the latter meridian northerly to Saskatchewan river. The need of this survey was imperative; it was expected to prove a difficult undertaking, but the necessity of completing it had been impressed upon Mr. Wallace. Starting from Prince Albert in the latter part of May, difficulties at the beginning were only those usually met with in a bush survey, but after crossing the Saskatchewan, some of the endless muskegs of that northern country were encountered, and then the troubles of the party commenced. Mr. Wallace tried to find a way round, but there was none around these muskegs, and he had to go right through. After floundering nearly three months, in the fall of the year, through these half frozen swamps, he found himself, towards the end of December, at the foot of the Pasquia mountains, a rough stretch of country rising 1,400 feet above Carrot river. Five of his horses were dead, the remainder were rapidly failing, and he was far from supplies. 'We had been,' he says, 'through some hard work in the muskegs, but the experience of getting the line over these hills, or rather mountains, put all else in the shade. Not only had we the deep snow and the rough country, but being on the northerly slope of the mountains, we were exposed to the bitter winds coming in over the vast open areas to the north, and were deprived by the slope of the small amount of warmth in the sun, as it seldom rose, so far as the valleys are concerned, until ten o'clock, and set about half-past one or two.' The survey was finally completed on March 12; its success was due not only to pluck and energy displayed by Mr. Wallace, but also to his excellent arrangements for feeding his pack train and provisioning his party. Incidentally he discusses transportation by dogs and by pack horses, and he indicates the considerations which must guide a surveyor in adopting one or the other mode of transportation.

Another notable example of devotion to duty is furnished by Mr. A. W. Johnson, who is in charge of the surveys in the western half of the British Columbia railway belt. For the last three years, a considerable part of his time has been spent in marking upon the ground the limit of the belt. This line was laid down on the maps at a fixed distance of twenty miles from the railway, and as may well be imagined, it goes over some of the wildest parts of the mountains. The survey of such a line requires steady nerves and continuous hard work. Such luxuries as tents are not to be thought of, and the bill of fare must be reduced to bare necessities. The men take with them only what they can carry on their backs, and the heaviest load is for the surveyor. 'I cannot,' Mr. Johnson says, 'spend months grading trails. People often say to me: "Why do you pack on your back?" I have found that unless I do so, and lead when difficult, dangerous, or dirty work is to be done, the men will not do it either, or if they do, only in a slipshod, half-hearted way.'

Many other instances might be cited showing that the services of surveyors, as a class, deserve hearty appreciation.

The parties were distributed from the eastern boundary of Manitoba to the Pacific coast.

Mr. C. F. Aylsworth, D.L.S., who was making surveys and re-surveys in eastern Manitoba, speaks of the industrial possibilities of Beausejour. He reports that the peculiar quality of the sand in that district is especially adapted for the manufacture of glass. A company of Germans has been formed and a factory has been erected in a place convenient to the sand, which is found in unlimited quantities. Cement blocks and steam-dried white bricks are also manufactured there, and all three industries promise well.

Mr. Wm. Christie, D.L.S., was employed on re-survey work in eastern Manitoba,

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and Mr. W. J. Deans, D.L.S., on similar work as well as on some new surveys in the provinces of Manitoba and Saskatchewan.

Mr. Geo. A. Grover, D.L.S., was at work in Manitoba on re-surveys and the inspection of surveys made under contract. For some years Teulon has been the end of the Stonewall branch of the Canadian Pacific railway, but this year the company is extending the line farther north, intending, Mr. Grover believes, to run eventually to Icelandic river on lake Winnipeg. This should prove a profitable line, for though the country is at present largely broken by marshes and swamps, these should gradually diminish with deforestation, and the soil in nearly all parts is excellent. This locality would seem to be well adapted for mixed farming and dairying, and the proximity of the great and rapidly growing market of Winnipeg would assure the settler good prices for his produce. The Canadian Northern Railway company also intends to extend its line along the shores of lake Manitoba from Oak Point. This also should prove a valuable extension, but there is a wide stretch between lakes Manitoba and Winnipeg that neither road seems desirous of entering, though the reason is not apparent, for it is a fertile country and fairly well settled, particularly when its distance from the railway and the difficulty of road travel are considered. Moreover, this should be a cheap country to build a railway through, there being no great engineering difficulties to overcome.

Oak Point is situated in a park-like piece of country, with oak clumps and prairie alternating, which faces on lake Manitoba. It has great natural beauty and Mr. Grover believes it is soon to be made into a summer resort. This neighbourhood has been settled for some time and the farmers all seem to be doing well. Cream is shipped to Winnipeg in large quantities, which will doubtless increase when better facilities for handling are provided.

Mr. David Beatty, D.L.S., made some correction surveys north of Prince Albert and east of Battleford.

Mr. E. W. Hubbell, D.L.S., was employed on re-survey work and inspection of surveys made under contract. Speaking generally of that portion of the province of Saskatchewan extending from Prince Albert in the north to Willow Bunch in the south, and from Milford in the east to Swift Current in the west, it may be said that of the thirty thousand square miles, twenty-five thousand are excellent agricultural land. It is being rapidly settled by a superior class of immigrants, many of whom may be designated as Canadian-Americans, men born in Canada, who emigrated to the United States, lived there many years, married, became possessed of property, and who now being persuaded that they can better their condition, have sold out and have taken up homesteads in the Canadian west. Mr. Hubbell estimates that, in the above mentioned district, for every square mile now under cultivation there are two hundred square miles of virgin soil.

Mr. W. R. Reilly, D.L.S., was employed on re-survey work in the province of Saskatchewan.

Mr. A. H. Hawkins, D.L.S., was engaged on surveys and re-surveys in the southern part of Saskatchewan and Alberta. On the way to make an examination of the third correction line he passed through Stirling and Lethbridge. Stirling is the centre of a new Mormon settlement and seems to be in a thriving condition. A large beet-root sugar factory at Raymond, some six miles west of Stirling, has created a very profitable industry. Irrigation schemes are being pushed in all directions, and the excellent produce of all kinds testifies to the fertility of the soil when properly watered. As one nears Lethbridge, several large irrigation canals are passed and the country assumes a still more settled aspect. Good buildings, larger stacks of grain and more fences mark the advance of civilization.

Similar surveys were made in central and southern Alberta by Mr. W. F. O'Hara, D.L.S.

Mr. A. W. Ponton, D.L.S., was employed during the early part of 1906 on block outline surveys in northern Alberta. Part of his work was in the vicinity of Lac la

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Biche. The country in this neighbourhood is generally wooded, poplar being found on the high land, and spruce in the swamps. The spruce timber available is sufficient to supply all lumber required for early settlement, but is too scattered for commercial purposes. A portable saw-mill would best meet local requirements. The soil is generally a good clay loam, becoming lighter and more of a sandy loam as the lake shore is approached. Lac la Biche has all the requisites for a summer resort, plenty of fish and game and beautiful scenery.

Mr. H. W. Selby, D.L.S., was in the vicinity of Lesser Slave lake, northern Alberta. The country is well suited for agriculture, but until there is nearer railway communication there will be no great influx of settlers, as there is no outlet for their produce.

Mr. Arthur Saint Cyr, D.L.S., ran some block lines in the Peace River district. In the vicinity of Prairie River Settlement the quality of the soil is all that can be desired, and this section bids fair to become one of the most prosperous in the country. At Smoky river there has been much damage done by fires.

The settlers at Peace River Landing and at Brick's Settlement are at a great disadvantage on account of the scarcity of roads to their hay meadows. Coal is found in many places and the climate is better than that of the country to the south.

Mr. R. W. Cautley, D.L.S., who was surveying block outlines in Alberta, speaks of the great activity of the Edmonton district in railway construction, building, farming and lumbering. This has caused an unlimited and consequently an unsatisfied demand for labour and horses which has raised the wages of one, and the price of the other. In the vicinity of the important and growing town of Athabaska Landing there are several scattered settlements, but there yet remains much land that is suitable for occupation, and there is no doubt that a larger number of settlers will come into this country during the next year or two, particularly as it is served by the best wagon road out of Edmonton and Fort Saskatchewan, namely, the Athabaska Landing trail.

In southern Alberta Mr. A. L. MacLennan, D.L.S., was employed in making subdivision surveys and Mr. C. F. Miles, D.L.S., on survey and re-survey work. In the greater portion of the district traversed, that is, in the wooded country, there is an abundance of game. This wooded portion is the chief hunting grounds for the Stony Indians, who kill deer in great numbers. Unless some restrictions are imposed to stop this indiscriminate slaughter, deer in this district will soon be exterminated. Nearly all the streams are well stocked with fish, the principal varieties being mountain, speckled and bull trout and grayling. There are also plenty of mountain grouse and partridge, and in certain localities a few prairie chicken.

Mr. C. C. Fairchild, D.L.S., was also working in southern Alberta.

Mr. L. E. Fontaine, D.L.S., was employed in southern and central Alberta in making surveys and re-surveys and in inspecting contracts. During the season he travelled over that part of Alberta lying between townships 37 and 52 between the fourth and fifth meridians. Great changes, he notes, have taken place in that district since 1898. Then a farm house or a ranch would be found every thirty or forty miles, but now the traveller is never out of sight of one or the other, and instead of vast wildernesses, beautiful fields of waving grain are now to be seen in every direction.

Mr. L. T. Bray, D.L.S., was engaged in subdivision and re-survey work in southern Alberta.

Mr. G. J. Lonergan, D.L.S., was employed in central Alberta in re-survey work and in the inspection of surveys made under contract. Following the Victoria trail northeast from Fort Saskatchewan, the country passed through is all well settled. Mixed farming is successfully carried on, considerable attention being devoted to hog raising. There is a splendid opening here for a large pork packing establishment. At present there is a small plant, but it is hopelessly inadequate. Contrary to the general idea, Stony plain is not a rough, rocky place. It is level, the soil is a rich sandy loam and it is known to grow the best No. 1 hard wheat in the Edmonton district. This plain was formerly part of the reservation for the Stony Indians, and

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hence its name. At St. Paul de Metis there is a Roman Catholic mission which was started eight years ago by the Rev. Father Therien. They have changed a scrub country into a profitable farm and beautiful garden, and have built a large church, a school and a convent. The mission has a steam thresher, a saw-mill, a shingle mill, a flour mill and a crusher, besides a full supply of farming machinery.

Mr. Jos. E. Ross, D.L.S., during the past season was making surveys in the railway belt, Kamloops district, British Columbia. Near Ashcroft the soil is of such an absorbent nature that irrigation has a tendency to cause slides. At Spatsum the land is stony, hilly and broken, and fit only for grazing. Gypsum deposits occur here, and some development has been made. The valley of Incomappleux river is bounded by mountains on each side. This valley is fit for settlement, with plenty of timber on the higher grounds. Valuable minerals have been found high up in the mountains, but cannot be worked at a profit, owing to the high cost of transportation.

Mr. A. W. Johnson, D.L.S., was in the western portion of the railway belt in British Columbia. During the season he made a re-survey of the townsite of Hope. All that is needed to make this place a resort for tourists, is a railway, because a pleasanter spot for a summer holiday could scarcely be found. There is splendid trout fishing close to the village, mountain climbing and big game shooting for those who care to take the risk of climbing after goats, or the trouble of forcing their way through the thick brush to the high open slides which are the feeding grounds of bears. Another place that would make an ideal summer resort is Chilliwak lake. It would be easy to build a good wagon road up to the lake and then it could be reached in a day from the town of Chilliwak. The fishing is good, the scenery magnificent and there is nearly always a good sailing breeze.

MISCELLANEOUS SURVEYS.

Mr. J. F. Richard, D.L.S., surveyed settlements at Cumberland House, The Pas and Big Eddy on Saskatchewan river. Cumberland House, including the Indian reserve, has about 600 inhabitants, two-thirds at least of which are of Indian origin. The language generally spoken is Cree, although several of the half-breeds understand English, and a few of them understand French. A considerable trade in furs is carried on.

Big Eddy Settlement is situated to the north of Saskatchewan river on the rear line of The Pas Indian reserve. There is no cultivable land unless extensive draining operations are carried out, the country being a plain covered with moss from twelve to twenty-four inches deep. The population, including the Indians, numbers about 500; they profess the Anglican religion. A branch of the Canadian Northern railway running towards Hudson bay will probably reach The Pas during the course of the summer.

Mr. J. B. Saint Cyr, D.L.S., made a survey of the settlements in the neighbourhood of Fort Vermilion, on Peace river. Large tracts are well adapted for farming and ranching; grain paid very well during recent years, the Hudson's Bay company paying as much as one dollar and fifty cents a bushel for wheat. Extensive beds of limestone have been found, as well as large deposits of salt near Salt river. There is a seam of good soft coal at a place called 'The Cliff,' fifteen miles north of Peace River Landing; it is about three to five feet thick. Fish and game are found in abundance.

While making various miscellaneous surveys and supervising some of the arrangements for transport, &c., Mr. P. R. A. Belanger, D.L.S., in the course of the season travelled several hundred miles across the different provinces, and found everywhere an activity greater than at any time in the past. In the Edmonton district the country is filling up fast, although there is still a large quantity of desirable land ready for settlement. This district is an ideal country for farmers from Ontario and Quebec who cannot be content to settle in open country where wood is not found for miles around.

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On his way from Kamsack to the Touchwood hills and Prince Albert, he passed through three Doukhobor villages, Veregin, Buchanan and a village situated about two miles west of Buchanan. The houses are in rows a few feet distant from one another, are built with great symmetry and have a very neat, clean appearance. The Doukhobors, he says, are a very moral, quiet and industrious people, and, notwithstanding their occasional foolish pilgrimages, are undoubtedly desirable settlers. They have already cultivated a large proportion of their land, and their crops rank among the best in the locality.

At a short distance north of Touchwood Hills postoffice, there is a small settlement named Wishart established several years ago on the western edge of Round plain. This is a very rich country, the farmers are all well off and they carry on mixed farming with great success. Mr. Belanger saw there some of the best wheat that was grown in the west last summer. The adjoining land, the Round plain, is, however, mostly vacant, although the land is much the same. This is because speculators have acquired it with scrip and are holding it at a high price.

Mr. R. C. Laurie, D.L.S., made a re-survey of the townsite of South Battleford.

Mr. J. A. Macdonell was engaged in an exploration survey for the purpose of selecting three and a half million acres, a grant to the Dominion government in that portion of the Peace River district of British Columbia lying east of the Rocky mountains and adjoining the province of Alberta.

Mr. J. A. Kirk, D.L.S., made some miscellaneous surveys along Blaeberry creek, in the railway belt in British Columbia. The valley of Blaeberry creek is of no apparent value except for its timber. The soil is not favourable for timber of large size, hence the large cedar is usually hollow, and large healthy trees of any kind are rare. Still the valley produces fair timber, which with proper protection will prove a valuable asset.

Mr. P. A. Carson, D.L.S., continued the triangulation of the railway belt in British Columbia, the main object of this work being to furnish points of reference for the extension of subdivision surveys at a distance from the railway.

Mr. Arthur O. Wheeler, topographer, extended his photo-topographical survey of the Yoho Park in the Rocky mountains. Altogether forty-seven ascents were made and eighty-nine camera stations occupied, from which four hundred and seventy-one plates were exposed. The districts round Mts. Douglas and Drummond furnish a paradise for botanists and those fond of camping amidst beautiful scenery. The locality may be said to be one of the most attractive of the Rocky mountains.

Irrigation surveys were continued under the direction of Mr. John Stewart, D.L.S., Commissioner of Irrigation, Calgary, Alberta.

EXPLORATION SURVEYS.

Four parties under Messrs. J. W. McLaggan, P. G. Stewart, A. D. Moodie and W. Thibaudeau, were detailed to explore the country along the route of the proposed branch of the Canadian Northern railway between Erwood and Fort Churchill, on Hudson bay. This line is to pass through The Pas, the part between Erwood and The Pas being now under construction.

Mr. J. W. McLaggan examined the country between The Pas, Paint lake and Burntwood river.

Messrs. P. G. Stewart and A. D. Moodie explored between Erwood and The Pas, Mr. Stewart being allotted the western portion and Mr. Moodie the eastern portion of this tract of country, while Mr. W. Thibaudeau examined the country lying between Fort Churchill and The Pas.

The object of these surveys was to get a detailed description of the country as to its general character, the nature of the soil, its fitness for agriculture, the value, quantity and location of the timber, the mineral resources and the climate.

Mr. J. W. McLaggan reported on the district between The Pas, Paint lake and Burntwood river. This is a sportsman's paradise. During the trip, he saw ten moose,

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six bears, one deer, one timber wolf, over a dozen lynx, a number of mink and other fur-bearing animals and ducks and geese innumerable. There are spots of good farming land and there should be no difficulty in raising good crops of all the hardy grains and vegetables, but the difficulty would be to make roads from one place to another, as the country between the spots of good land is rough and rocky.

The whole country from Grass river to Burntwood river, with the exception of small areas along the lakes and rivers, has been swept by fire. There is a growth of young timber coming up since the fire, which may be of value in time. As a mineral country there is a wide field for prospectors; Mr. McLaggan saw indications of gold, silver, iron and limestone. The preliminary survey of the railway to Hudson bay has already been made from The Pas to the southeast of Reed lake; he thinks that from there the railway should cross Grass river between Reed and Wekusko lakes, and continuing down the north side of Grass river and Setting lake, pass to the north of Paint lake. This route would take the railway through the part of the country where there would be the most traffic.

Mr. P. G. Stewart explored the region northwest of Etoimami and of the Hudson Bay branch of the Canadian Northern railway to The Pas. All through, the country is well covered with timber of all kinds, but poplar and spruce are most plentiful. He estimates the amount of standing timber available in this tract at about 600,000,000 feet B.M. The country is much the same as that explored by Mr. J. W. McLaggan.

Mr. A. D. Moodie's exploration was along the right of way of the Canadian Northern railway, between Erwood and The Pas. The part first examined was that section lying between Leaf lake on the east, and the Canadian Northern railway right of way on the west. The larger part of this section consists of mossy muskegs sparsely dotted with spruce and tamarack scrub, and of gravel ridges, with spruce and small poplar; it is consequently unfit for agriculture. The poplar is mostly small, and is good only for pulpwood. Spruce suitable for lumbering is scattered. Moose, caribou, bears and smaller fur-bearing animals are abundant.

The general character of the country from the north end of Leaf lake to The Pas and as far as thirty miles east of the grade, which is already constructed to the latter point, is very similar to that of the section just described, except that the timber is of better quality and is more plentiful.

The country lying to the east and north of Little Pasquia river is composed entirely of muskeg with spruce and tamarack scrub. Its character can be judged from the fact that for days together the party was compelled to wade in water to the knees.

The population of The Pas is about five hundred, including Indians. Most of the inhabitants belong to the Church of England, which has a mission under the charge of Mr. Edwards. The village consists of a few half-breed houses, two stores and the mission.

The branch of the Canadian Northern railway to Hudson bay runs through a muskeg country nearly the whole way from Etoimami to The Pas, a distance of eighty-nine miles. The engineers discovered that the muskeg of this particular section rested on a solid foundation of limestone gravel at a depth of three to six feet below the surface, and they claim that once the muskeg is drained a good road-bed will be obtained.

Mr. W. Thibaudeau, C.E., explored the country lying between Fort Churchill, on Hudson bay, and The Pas, on Saskatchewan river.

Churchill harbour has an entrance 2,000 feet wide and vessels drawing thirty-six feet of water may approach to within 200 yards of the west shore, while vessels drawing twenty-four feet may approach to within 150 yards of the east shore. No great difficulty will be experienced in keeping the harbour clear of ice all the year round. Churchill harbour lies between two peninsulas. On the west peninsula, sandstone, limestone and white quartzite are found. On the east peninsula there are splendid building sites and plenty of good limestone for building purposes.

Fort Prince of Wales, at the west of the entrance to the harbour, was built in 1733. The walls are thirty-four feet thick and sixteen feet high. It was originally mounted with forty cannon.

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The present Fort Churchill is situated on the western shore about five miles from the mouth of Churchill river. This is the headquarters of the Hudson's Bay Co.

Timber for fuel is plentiful along the river. Salmon trout and whitefish are to be had at all seasons. Potatoes and vegetables are successfully grown, and good hay is to be had in abundance on both sides of the river. Game of all kinds is plentiful.

Between Churchill and North rivers the ridges are overgrown with small spruce and tamarack, but for the most part the country is level; it is covered with moss and small ponds and is constantly frozen up.

The same description applies to the land between Churchill and Owl rivers.

About one-third of the country from Fort Chrchill to The Pas is marsh. The higher lands are covered with spruce and tamarack, suitable only for fuel and pulpwood. No minerals of any kind are to be seen. Water-power is available from Deer, North, Churchill, Nelson, Burntwood and Grass rivers. Whitefish abound in all the lakes, and some trout, pike and sucker are occasionally to be had. Moose and caribou may be seen in fair numbers and also some rabbits, spruce grouse and ptarmigan. The total distance covered by Mr. Thibaudeau on his exploration was 690 miles.

The following is a comparison of the mileage surveyed since 1904:—

	Fifteen months Jan. 1, 1906 to Mar. 31, 1907.	1905.	1904.
	Miles.	Miles.	Miles.
Township outlines.....	1,306	1,591	1,285
Section lines.....	8,962	10,544	24,488
Traverse.....	1,848	1,809	4,441
Re-survey.....	4,948	2,579	7,699
Total for season.....	17,064	16,523	37,913
Number of parties.....	56	46	80
Average miles per party	305	359	474

The following table shows the mileage surveyed by the parties under daily pay and by the parties under contract:—

Work of Parties Under Daily Pay.	Fifteen months, Jan. 1, 1906, to Mar. 31, 1907.	1905.	1904.
	Miles.	Miles.	Miles.
Township outlines	756	1,008	719
Section lines.....	1,035	939	235
Traverse.....	643	421	223
Re-survey.....	4,815	2,499	2,122
Total for the season	7,249	4,867	3,299
Number of parties.....	29	26	22
Average miles per party.....	250	187	150

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Work of Parties Under Contract.	Fifteen months, Jan. 1, 1906, to Mar. 31, 1907.	1905.	1904.
	Miles.	Miles.	Miles.
Township outlines.....	550	583	566
Section lines.....	7,927	9,605	24,253
Traverse.....	1,205	1,388	4,218
Re-survey.....	133	80	2,809
Total for the season.....	9,815	11,656	31,846
Number of parties.....	27	29	57
Average miles per party.....	364	583	559

NOTE.—Owing to the nature of their work, the parties under Messrs. P. A. Carson, R. C. Laurie, J. A. Macdonell, J. W. McLaggan, A. D. Moodie, P. G. Stewart, W. Thibaudeau, and A. O. Wheeler, are not included in the statement of mileage for the fifteen months from January 1, 1906, to March 31, 1907.

DESCRIPTION OF TOWNSHIPS.

Descriptions of the townships subdivided have been compiled from the surveyors' reports received during the nine months ending March 31, 1907; they are given as appendix No. 46. The townships are put in order of township, range and meridian, and the descriptions are preceded by a list of all townships described.

Until the year 1893 such descriptions were published from time to time in separate volumes, but these volumes are now out of print and, moreover, are out of date, the last fifteen or twenty years not being included. As many applications are made for such information, the need of revised editions of these descriptions is becoming urgent, and it is hoped that they may be prepared at an early date.

SURVEY OF BLOCK OUTLINES IN THE PEACE RIVER DISTRICT.

The Peace River district having attracted considerable attention during recent years, a short account, such as may properly come within the scope of this report, of the initial surveys within the district may be opportune. A brief description of the method adopted in locating an initial point, with a passing notice of the difficulties encountered in a new field and a statement of the accuracy of the work performed as proven by later surveys, is all that will be attempted. For a description of the country, its resources, its climate, the fertility of its soil and the beauty of its scenery, other sources of information must be consulted.

The position of the sixth initial meridian in longitude 118° affects directly the location of the 120th meridian of longitude, which in the vicinity of Peace river forms the boundary line between the provinces of Alberta and British Columbia. It is, therefore, important that the position occupied by the sixth initial meridian, as surveyed on the ground, be established beyond reasonable doubt. Recent base line surveys in that district show that the posts on this meridian are about sixteen chains too far south, and the whole line about five chains too near to the fifth meridian.

This difference arose in the traverse survey by which an initial point on the sixth meridian was first established, but was not discovered until the spring of 1905, when the survey of the nineteenth base line between the fifth and sixth meridians was completed, affording the first check on the position of the sixth meridian.

The inception of the regular surveys in the Peace River district goes back to 1882, when it was decided to establish some block outlines. For this purpose a portion of the sixth initial meridian had first to be located. The nearest Dominion land

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survey line, at that time, was the fifth meridian, which, during the season of 1882 had been produced north across Athabaska river to the north boundary of township 71. The position of the sixth meridian was established by a cross country traverse from a point on the fifth meridian near its intersection with Athabaska river.

Mr. Wm. T. Thompson, D.T.S., who was entrusted with this survey, left Edmonton with his party on September 22, 1882, travelling by pack trail towards Lesser Slave Lake settlement, until the Pembina river was reached. At this point two scows were constructed of spruce lumber made by whip-sawing the large timber found in the river valley. The outfit and supplies were conveyed in these scows down the Pembina and Athabaska rivers to the mouth of Lesser Slave river, and up this to the foot of the lake. Here a number of sets of observations for latitude by transits over the prime vertical were taken by Mr. Thompson while waiting for ice to form before proceeding with the survey.

Early in December the geodetic traverse was commenced from the foot of Lesser Slave lake and continued easterly through the most favourable country. The general course of the river was followed for a distance of thirty miles to the junction of Lesser Slave and Athabaska rivers, where a point was established to be connected later with the fifth meridian by Mr. W. Ogilvie, D.L.S., when his survey of that line should cross Athabaska river. This point was indicated by a blazed tree marked 'Station O.' The traverse line was then run westerly across the lake and continued through the most open country by way of Stinking lake to Smoky river, where further observations for latitude were made. Care was taken to keep the line as nearly as possible in an east and west direction and the alignment was checked by frequent observations for azimuth.

From the foot of Lesser Slave lake to this point all transportation was necessarily by means of dog trains furnished by the natives, who had a considerable settlement at the head of the lake. Spring overtook the party at the crossing of Smoky river, and the method of transporting supplies which had been of such service during the winter months had to be abandoned. The dog trains were sent back to the lake and pack horses procured for bringing in supplies and moving the outfit.

In the meantime Mr. Ogilvie had established a connection between the fifth meridian and the point previously marked at the mouth of Lesser Slave river by Mr. Thompson. This point was found to be 186.03 chains west and 55.08 chains north of the northeast corner of section 13 in township 71, range 1, west of the fifth meridian. On receipt of this information Mr. Thompson continued his traverse line westerly the required distance to reach the sixth meridian. The differences of latitude and longitude between the initial and terminal points of the traverse line were carefully computed by means of geodetic formulæ and the latitude checked by further observations of transits over the prime vertical. The mean of four nights' observations made the latitude of the terminal point nearly seven seconds less than the latitude computed from the data furnished by the traverse line. Owing to the proximity of Birch hills to the north and the valley of Smoky river to the south, the location was not considered favourable for the determination of the latitude, which might be affected by abnormal deviations of the plumb line. As cloudy weather prevented observations later at more favourable points on the production of the meridian northerly, only a slight correction was made to the computed latitude before permanently planting the posts on the meridian. Practically the meridian was established from the traverse alone, no use being made of the latitude observations.

It is to be regretted that Mr. Thompson was not favoured with better weather so that a number of observations could have been taken at points suited for the accurate determination of the latitude. A difference of 16 chains in the position of the posting on the meridian represents a difference of 10 seconds in latitude. With good weather and a favourable location it is practically certain that the surveyor, by exercising his usual precautions, would have very materially reduced this discrepancy. Even then, had he trusted his latitude observations, the error would have been re-

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duced to a little over five chains. The position in longitude of the meridian line checks fairly close with the measurements made on the different base lines which have since been completed between the fifth and sixth meridians. According to the twentieth base line, which for some distance passes through the same locality as the traverse line, the position of the sixth meridian differs from its theoretic location by only 1.69 chains. Such agreement reflects credit on the chain-bearers engaged on the traverse.

The linear measurements were made by means of a steel band tape; the observations for azimuth and latitude and the production of the line were effected with a six-inch transit theodolite. When it is remembered that the length of the steel band tape is affected directly by the temperature and varies from other causes, that the surface irregularities and unequal elevation of the country, as well as the personal errors of the chain-bearers are factors which affect the accuracy of the surveyor's measurements, but the value of which cannot be satisfactorily determined, the result, in respect to longitude, is very creditable.

During the progress of the survey Mr. Thompson's assistant made a micrometer survey of Lesser Slave river and lake, ascertaining also the leading features of the adjacent country.

The fifth and sixth meridians are now connected by five consecutive base lines, which taken together, furnish the best available evidence as to the position which the sixth initial meridian occupies with respect to the 118th meridian of longitude with which it theoretically should coincide. The sixteenth base line was run by R. W. Cautley, D.L.S., in the summer of 1904, and winter of 1905; the seventeenth was surveyed in three sections by A. Saint Cyr, D.L.S., in 1904, A. Driscoll, D.L.S., in 1905, and A. Saint Cyr, D.L.S., in 1906, respectively; the eighteenth was also surveyed in three sections by A. Saint Cyr, D.L.S., in 1904, J. N. Wallace, D.L.S., in 1905, and A. Saint Cyr, D.L.S., in 1906, respectively; the survey of the nineteenth was commenced by E. Bray, D.L.S., in 1904, and completed by A. Saint Cyr, D.L.S., in 1905, while the twentieth was run by H. W. Selby, D.L.S., in 1905, with the exception of the most westerly eleven miles, which had been previously surveyed by C. C. Fairchild, D.L.S.

The closings of the different base lines show the sixth meridian as located on the ground, to be somewhat east of its theoretic position, and the posting thereon to be too far south. The following table summarizes the evidence furnished by these lines:—

Base line.	Mer. too far east.	Posting too far south.
16 th.	8.78 chs.	15.24 chs.
17 "	4.85 "	17.00 "
18 "	7.14 "	15.77 "
19 "	3.02 "	18.44 "
20 "	1.69 "	16.41 "

A number of base lines have also been run west from the sixth meridian, two of which have been established as far as the boundary between Alberta and British Columbia. Various other outline surveys, as well, have been projected within the district, so that the way is now fairly prepared for the prosecution of subdivision work in any locality where such surveys may appear desirable.

It is the intention to move all the posts to correct latitude when the subdivision surveys are proceeded with.

A diagram showing the closings on the base lines between the fifth and sixth meridians accompanies this report.

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THE WESTERN BOUNDARY OF THE CANADIAN PACIFIC RAILWAY BELT IN BRITISH COLUMBIA.

The Settlement Act of 1883 described the Canadian Pacific Railway belt as follows:—

‘The public lands along the line of the railway before mentioned wherever it may be finally located to a width of twenty miles on each side of said line as provided in the order in council, section 11, admitting the province of British Columbia into confederation.’

In the Dominion order in council, approved on May 27, 1887, the western boundary of the belt is described as follows:—

‘Commencing at the intersection of the international boundary with the waters of Semiahmoo bay, a branch of Boundary bay, an arm of the Pacific ocean; thence westerly and northerly following the shore of said Semiahmoo bay and also of Mud bay, another branch of said Boundary bay, to the easterly limit of a road known as Mud Bay road; thence northerly following the said limit of said road to the southern bank of Fraser river; thence northerly to the point where the easterly limit of the north road touches the north bank of Fraser river; thence northerly following the said limit of said north road to the southerly shore of Burrard inlet; thence north-westerly to Pt. Roche, being a point where the westerly shore of the north arm of Burrard inlet joins the northerly shore of the main arm of Burrard inlet; thence northerly following the westerly shore of the said north arm of Burrard inlet to the most northerly part of the same; thence due north to the north boundary of township 7, range 7, west of the seventh initial meridian according to the Dominion Lands system of surveys adopted in the survey of the railway belt in British Columbia.’

By the order in council approved on March 29, 1895, an agreement was to be concluded with the government of the province of British Columbia. Clause 1 of said order reads as follows: ‘The province shall accept as the boundary of the railway belt the limits laid down and marked out by the Dominion order in council approved on May 27, 1887, and by the map attached thereto (a copy of which is hereto annexed), or the nearest township line to the boundary of the belt which would be found by actual admeasurement, as may be found by the Minister of the Interior most convenient.’

In the order in council of the British Columbia government, dated December 6, 1895, clause 1 reads as follows:—

‘The province shall accept as the boundary of the railway belt the limits laid down and marked out by the Dominion order in council, approved on May 27, 1887, and by the map attached thereto (a copy of which is annexed to the said report of the Privy Council approved by His Excellency on March 29, 1895), or the nearest section line to the boundary of the belt which would be found by actual measurement as may be found by the Minister of the Interior most convenient.’

In a letter dated June 23, 1896, the Deputy Commissioner of Lands and Works, Victoria, B.C., was notified by the Deputy Minister of the Interior that it had been decided to adopt for the boundary the nearest section line to the boundary of the belt which would be found by actual measurement, and diagrams showing the section line in question were inclosed.

Attention was drawn to the fact that the boundary shown upon the diagrams stops at the creek flowing from the north into the head of the north arm of Burrard inlet, leaving the western boundary of the belt undefined, therefore, it appeared that another notification to the provincial government under the provisions of the provincial order in council of December 6, 1895, would be necessary to fix the western boundary of the belt.

In a letter dated April 9, 1903, the Deputy Commissioner of Lands and Works, British Columbia, was asked if the province would agree to accept for the western boundary the line described in the order of His Excellency the Governor General in Council, of May 27, 1887, to which a reply was received as follows:—

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'In reply I beg to say that the boundaries referred to in that order, with the exception of that part which follows the westerly shore of the north arm of Burrard inlet, have always been understood by this government as agreed to between the province and the Dominion; but instead of the westerly shore of the north arm of Burrard inlet we have always considered the eastern shore of the north arm to be the boundary line, and we have sold and otherwise alienated islands lying in the said north arm. I, therefore, beg to suggest that the description in the order in council above referred to may be altered so as to make the easterly shore of the north arm the boundary between the provincial and Dominion lands.'

By the order in council of July 8, 1904, the eastern shore of the north arm of Burrard inlet was accepted as part of the western boundary of the railway belt, subject to the ratification of parliament and of the legislature of British Columbia, the said boundary to be as follows:—

'Commencing at the intersection of the international boundary with the waters of Semiahmoo bay, a branch of Boundary bay, an arm of the Pacific ocean; thence westerly and northerly following the shore of said Semiahmoo bay and also of Mud bay, another branch of said Boundary bay, to the eastern limit of a road known as Mud Bay road; thence northerly following the said limit of said road to the southern bank of Fraser river; thence northerly to the point where the eastern limit of the north road touches the north bank of Fraser river; thence northerly following the said limit of said north road to the southern shore of the main arm of Burrard inlet; thence due north to the northern shore of the said main arm; thence westerly following upon the said northern shore of the main arm to the eastern shore of the north arm of Burrard inlet; thence northerly following upon the eastern shore of the said north arm to the most northerly point of the peninsula between Bedwell bay and the said north arm; thence northeasterly on a straight line to the point where the northern boundary of township thirty-nine, west of the coast meridian intersects the eastern shore of the north arm of Burrard inlet; thence northerly following upon the said eastern shore to the mouth of Mesliloet river, a stream flowing from the north into the head of the said north arm; thence northerly along the middle of the main channel of the said Mesliloet river to the point of its intersection with the north boundary of township seven, in range seven, west of the seventh meridian, according to the Dominion Lands system adopted in the survey of the railway belt in British Columbia.'

In a report of a committee of the executive council of the government of British Columbia, approved by the Lieutenant Governor on August 13, 1904, it is stated that 'The committee observe that the recommendation of the Minister of the Interior that, subject to the ratification of parliament and of the legislature of British Columbia, the eastern shore of the north arm of Burrard inlet be accepted as part of the western boundary of the railway belt, is approved.

'The committee advise that the Dominion government be informed that the provincial government approves and accepts the recommendation of the minister.'

The Secretary of State called the attention of the Lieutenant Governor of British Columbia to the fact that the provincial minute, approved on August 13, 1904, merely accepted the eastern shore of the north arm of Burrard inlet as part of the western boundary of the railway belt, not the whole western boundary as described by metes and bounds in the minute of the Privy Council approved by the Governor General on July 8, 1904.

The report of a committee of the executive council, approved by the Lieutenant Governor on March 3, 1905, was, therefore, substituted for that of August 13, 1904. This accepts the eastern shore of the north arm of Burrard inlet as part of the western boundary of the railway belt and approves and confirms the said boundary as further defined in the order in council of July 8, 1904.

In a report of the committee of the Privy Council, approved by the Governor General on July 15, 1905, it was recommended that, as the government of the Domin-

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ion and of the province of British Columbia had agreed to accept a certain line for the western boundary of the Canadian Pacific Railway belt, the Minister of Justice be asked to have prepared for submission to parliament at its next session a Bill containing the necessary provisions for an Act to ratify the boundary in question in so far as the Dominion of Canada is concerned, and it was further recommended that the Lieutenant Governor of British Columbia be asked to have the necessary action taken by his government to ratify such boundary in so far as the province of British Columbia is concerned, by an Act of the legislature of that province.

In a report of a committee of the executive council, approved by the Lieutenant Governor on August 10, 1905, it was recommended that the Attorney General be requested to prepare a Bill to be laid before the legislature at its next session to ratify the boundary in question so far as the province is concerned. Accordingly a Bill was introduced, but when it came up for discussion it was pointed out that the Mud Bay road mentioned in the order of the Governor General in Council of July 15, 1905, does not extend to Mud bay, and at its northern end joins what is known as the Yale road, which leads to Fraser river at Brownsville, opposite New Westminster, and that instead of extending to the north bank of Fraser river, the north road, mentioned in said order, ends at the northeasterly limit of the city of New Westminster. To meet this difficulty it was considered necessary to make some amendments in the description of the boundary contained in the said order of the Governor General in Council, and the Dominion government having signified its consent to the changes, the Bill received the sanction of the Lieutenant Governor of British Columbia on March 12, 1906.

The description of the western boundary of the railway belt as ratified by the Provincial Act is as follows:—

‘Commencing at the intersection of the international boundary with the waters of Semiahmoo bay, a branch of Boundary bay, an arm of the Pacific ocean; thence westerly and northerly, following the shore of the said Semiahmoo bay, and of Mud bay, another branch of the said Boundary bay, to a point on the shore of Mud bay at the intersection of the west boundary line of township two, New Westminster district, with the waters of said Mud bay; thence north along the said west boundary of township two, to the northwest corner of said township two; thence northerly along the eastern side lines of the Mud Bay (or Scott) road, and the Yale road, to the south bank of Fraser river at Brownsville; thence northerly, crossing Fraser river to a point on the north bank of the said river where the eastern side line of the north road produced south would intersect the north bank of Fraser river; thence north to the eastern side line of said north road; thence north along the said eastern side line of said north road to its intersection with the south shore of Burrard inlet; thence north to the north shore line of Burrard inlet; thence westerly and northerly following the shore line of Burrard inlet to the most northerly point of the peninsula between Bedwell bay and the north arm of Burrard inlet; thence northeasterly on a straight line to the point where the northern boundary of township thirty-nine west of the coast meridian intersects the eastern shore of the north arm of Burrard inlet; thence northerly, following upon the said eastern shore to the mouth of the Mesliloet river, a stream flowing from the north into the head of said north arm; thence northerly along the middle of the main channel of the said Mesliloet river to the point of its intersection with the northern boundary of township seven, in range seven, west of the seventh meridian, according to the Dominion Lands system adopted in the surveys of the railway belt in British Columbia.’

A Bill to ratify the agreement between the government of the Dominion of Canada and the government of the province of British Columbia respecting the western boundary of the railway belt received the sanction of the Governor General on March 22, 1907.

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ASTRONOMICAL FIELD TABLES.

The astronomical field tables, as described in the report of 1906, are still being issued. These tables were formerly set up in type and printed in the ordinary way, but it was difficult to obtain them from the printers in time for issue to the surveyors. Inasmuch, however, as a great deal of the matter contained in the tables is the same from year to year, forms containing all those parts which never vary have been made, so that when a new set of tables is required, only those parts which vary have to be added to the forms. The forms themselves, as well as the variable data to be added, are stamped by means of type, and the titles, footnotes, &c., are printed by a small handpress and pasted on the form in the proper place. The finished table is then reduced and printed by photo-zincography, thus avoiding all delays in printing.

The diagram of the altitude and azimuth of the pole star, as described in the report of 1906, is issued periodically with the field tables.

A star map is now being constructed for the convenience of observers for latitude. It will facilitate the selection of pairs of stars for Talcott's method.

IMPROVEMENT OF SURVEYS.

The improvement in execution of fieldwork, mentioned in previous reports, is well illustrated by a remark made by one of our surveyors who was engaged in re-tracing old surveys and afterwards in making an inspection of some recent subdivisions. He writes: 'To change from retracing old lines run twenty years ago to inspecting present day contract work is, I fear, not in the interest of rigid inspections. There has been such an improvement, not in any particular, but in every detail of the surveys made in this country in the past twenty years that one would hesitate to speak of them as being the same class of work. In no way could the advantage of the numerous modifications in the Manual and in the field instruments used be more markedly illustrated than by this change which I was forced to make this season. The lines examined in contracts of 1906 were straight, the chainage good and the corners well marked, none of which could be said, as a rule, of the more ancient surveys in this country.'

CORRESPONDENCE.

The correspondence consisted of:

Letters received.. . . .	7,300
Letters sent.. . . .	8,209

The staff consists of the secretary, one clerk, two stenographers and typewriters and two messengers.

ACCOUNTS.

The accountant's record shows:

Number of accounts dealt with.. . . .	493
Amount of accounts.. . . .	\$515,040
Number of cheques forwarded.. . . .	1,896

The staff consists of an accountant and an assistant accountant.

OFFICE STAFF.

A list of the office staff of the Topographical Surveys Branch at Ottawa is given in appendix No. 11.

A number of changes have taken place during the nine months ending March 31, 1907. In the Metcalfe Street office Mr. Percy Wilkinson has been appointed assistant accountant, and J. O'Leary messenger in place of F. T. Ellis, who was transferred to

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another branch. Mr. Geo. H. Watt, chief of the first division, has resigned to take a survey contract. Messrs. H. G. Barber, A. J. Elder, W. T. Green, F. W. Rice, E. E. D. Wilson and W. E. Weld have been absent all or part of the time, acting temporarily as assistants to surveyors. Mr. P. A. Carson, who is in charge of the trigonometrical survey, spent the summer in British Columbia. Miss G. B. Campbell and Messrs. H. A. Mackenzie, C. C. Smith, Wm. Crawford and H. L. Chilver of this office, and Messrs. M. W. Sharon and S. B. Roach, of the geographer's office, have resigned. Mr. L. J. Gleeson has been detailed to another branch and Mr. F. H. Mackie has been transferred to the office of the chief astronomer. Mr. H. J. Higgerty has been transferred from the lithographic office to the Timber and Mines Branch.

The additions to the staff during the past nine months are: A. Brown, E. L. Burkholder, J. C. Ball, E. E. Brice, C. Fitzgerald, J. B. Hutton, R. V. Heathcott, M. Kimpe, J. F. Moran, J. A. Macdonald, F. L. Marriott, J. W. Rochon, H. J. Smith, R. O. Spreckley, A. Tremblay, J. N. Goodall, who was re-appointed, and P. F. X. Genest, who was transferred from the Yukon office. Mr. E. Villeneuve was changed from the lithographic office to the office of the chief draughtsman. Those appointed to the lithographic office are: S. Boyle, J. Gagnon and S. H. Shore; the latter was recently transferred to the office of the chief draughtsman. Messrs. W. Anderson, W. Blue, J. Beveridge and F. B. Inkster were appointed to the geographer's staff; Mr. E. G. Ouimet to the photographer's staff, and Mr. N. Landry to the survey records office as messenger.

OFFICE OF THE CHIEF DRAUGHTSMAN.

A summary of the work executed in the chief draughtsman's office is given as appendix No. 6.

This part of the branch is divided into five divisions.

First Division—Instructions and General Information.

In this division instructions are prepared for all surveys to be performed in the field. When the surveyor has been selected, instructions are prepared for him giving any directions that may be necessary in connection with the survey. In the case of parties under day pay, the surveyor is also instructed as to the size of party, the place of organization, the nature of the transport outfit and the rate of pay to employees. Outline sketches are furnished to him showing the monuments, bearings and distances of the lines of Dominion land surveys already established in the vicinity of his work. He is also supplied with maps or plans of all Hudson's Bay Company reserves and Indian reserves in the neighbourhood. Field books, astronomical field tables, stationery, forms for accounts, statutory declarations, &c., are also furnished. During the nine months ending March 31, 1907, instructions were issued for eighty-six survey parties, involving the preparation of 798 sketches, and 328 maps and tracings.

In this division all returns of survey from the surveyors are received. They are dated, stamped, and posted in the various registers under the name of the surveyor. They are then sent to the second division for examination. The receipts during the nine months were 630 progress sketches, 390 books of field notes, 169 plans, 56 timber reports and 382 statutory declarations. After examination and the compilation of the plans, the books of field notes are returned to this division and forwarded to the survey records office. During the nine months 643 field books and the returns of 67 miscellaneous surveys were placed on record. Entries are also made in the registers for all township and other plans printed. Plans of 520 townships, 4 townsites, 49 miscellaneous surveys and 52 sectional sheets were printed during the nine months.

When the progress sketches sent in by the surveyor have been examined and found satisfactory, preliminary plans for the townships are issued, four copies for each township. One copy is placed on file in this office and one each furnished to the

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survey records office, the Land Patents Branch and the land agent. The object of these plans is to allow of the land being opened for entry at once, without waiting for the final examination of the surveyor's returns and the issue of the official plan. Preliminary plans of 179 townships were issued during the nine months.

At the close of each month a list of the surveys approved during the month is forwarded to the secretary of the department. Every six months another list of the whole townships, fractional townships and partially surveyed townships, the surveys of which have been approved, is sent to the secretary. Under the provisions of sub-clause 7 of clause 22 of the Dominion Lands Act, the governor of the Hudson's Bay company is to be notified of the surveys approved, and the list is for the purpose of giving the notice called for by the Act.

Numerous communications on miscellaneous matters pertaining to surveys are dealt with in this division. To reply intelligently to many of these questions requires days of search for information among various sources, frequently in different branches of the department. During the nine months 743 such communications were dealt with, involving the preparation of 258 sketches, maps, &c.

Second Division—Examination of Surveyors' Returns.

A detailed description of the system of examining and dealing with surveyors' returns was given in the annual report for the year ending June 30, 1906. The same system is still in force, with some few improvements in the minor details.

The room formerly occupied by the geographer and his staff on the second floor of the Metcalfe Street office, having been vacated, the partition between it and the room occupied by the compiling and examining staff, and also an unused elevator shaft were removed, thus affording increased accommodation and better working facilities. Temporary quarters were procured in the Orme building on Wellington street, while this work was in progress, and the disadvantage of part of the staff being removed from registers, plans of former surveys and other sources of information, retarded the work to some extent. In addition to the removal of the partition, a ventilating system was installed, this being easily accomplished by utilizing part of the space formerly occupied by the elevator shaft. The value of this provision for ventilation is inestimable, as a plentiful supply of good fresh air is now available, whereas before, no provision whatever was made for ventilation.

The work has been materially increased by the passage of an Act respecting roads and road allowances in the provinces of Saskatchewan and Alberta (section 6 of chapter 100 of the Revised Statutes of Canada), which provides that where a survey is made of a road diversion, a duplicate copy of the plan of such survey, approved by the chief engineer of the Department of Public Works of such province, shall be forthwith transmitted by the said Department of Public Works to the Surveyor General, who, within one month from the receipt of it by him, may require the plan of such survey to be withdrawn from the land titles office by the Department of Public Works of such province.

Before patents issue for Dominion lands required by railway companies for the right of way of their lines, the plans of such railways must be examined and approved by the Surveyor General. A large number of these plans have accumulated and their examination involves considerable work. Although some progress has been made in re-issuing township plans out of print, the number of plans of which reprints are required has increased rather than diminished during the past nine months. The demand for township plans has become so great, that the stock of those issued years ago, of which only a small edition was printed, soon became exhausted. Larger editions are now printed, so that unless on account of additional surveys, plans recently issued are not likely to require re-issue for many years to come.

The work of this division during the past nine months is as follows:—

Plans compiled..	409
Subdivision returns examined..	312
Outline returns examined..	122
Miscellaneous survey returns examined..	210
New editions of township plans..	72
Progress sketches examined—contractors..	205
Progress sketches examined—day men..	270
Memoranda sent to surveyors..	329
Memoranda received from surveyors..	342

Third Division—Drawing for Reproduction.

The third division of the draughting staff is engaged chiefly in making finished copies of township and other plans for reproduction by photo-zincography or lithography. During the nine months 527 plans of townships were prepared for printing. For part of this period, while the offices were being renovated, the staff was divided, a number of the draughtsmen remaining at the office on Metcalfe street, while the others were accommodated in temporary quarters on Wellington street. This separation of the staff impeded the progress of the work.

Seventy-nine drawings and plans of a miscellaneous nature were undertaken. Some of the most important of these were the astronomical field tables for the use of surveyors. The present method of preparing these and also the new star map, is described under a separate heading.

A map in colours, showing the route of the proposed Hudson Bay branch of the Canadian Northern Railway, was compiled and printed. This map shows the routes of explorers who recently visited the district, the main features of the country through which the railway will run, and the saving in rail transportation from the western provinces.

The original plans for photo-zincographing are carefully filed away; when new editions of any of them are required, it is only necessary to add the information obtained from later surveys and to photograph them again.

An improvement has been made in the attachment used in the stamp, for holding the type, while stamping a plan. The old holder (see fig. 1) consisted of a solid frame,

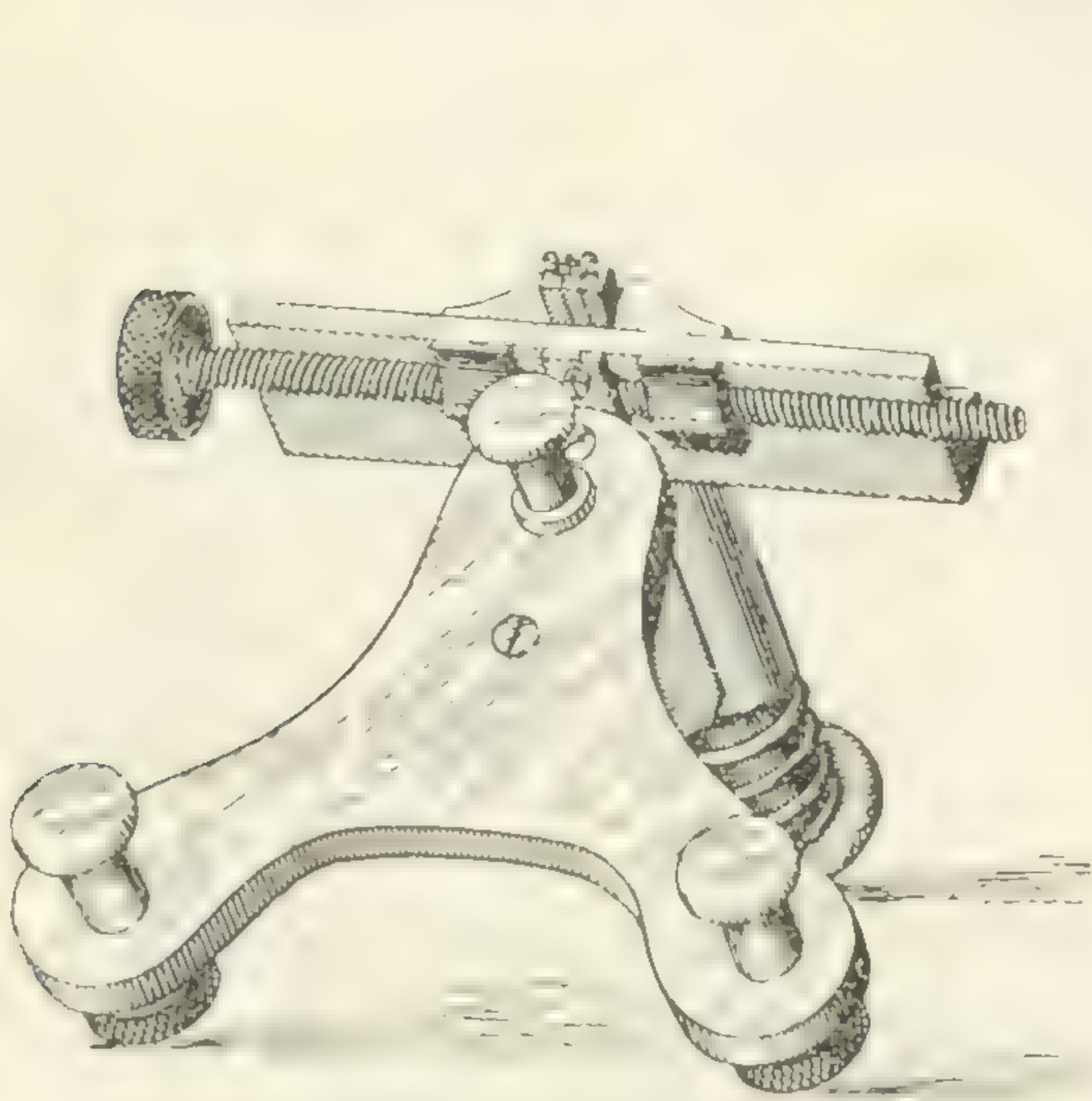


Fig. 2

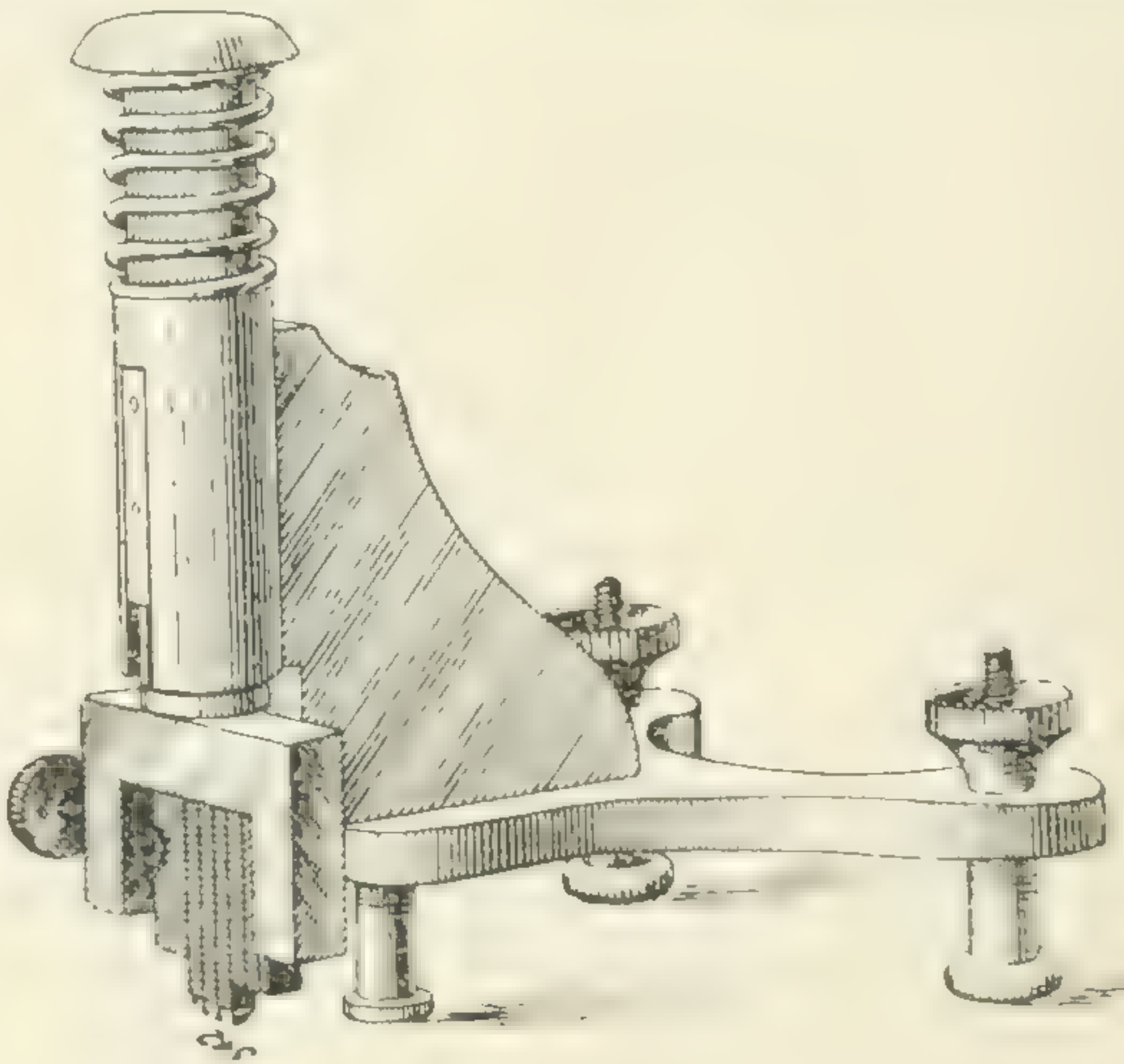


Fig. 1.

cut out in the front to receive the type, with a horizontal thumb screw passing through one side, by means of which the type was held securely in place. This necessitated the use of quads or other small pieces of metal, in order to fill up the extra space in the holder, after the type had been placed at the centre. Considerable time

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was required to adjust each setting of type and quads; also the action of the end of the thumb screw against the soft metal of the quad soon wore it away and created a tendency for the screw to work out of line, enlarging the threaded hole in the holder.

The new holder (see fig. 2) consists of a one-piece frame, having the front shaped out to receive two movable jaws. These jaws have each a projection on the back which slides in a slot in the back of the holder. Through these projections and in the rear of the holder, passes a thumb screw having a bearing at its centre, half in the back of the holder and half in a small cap attached to the back of the holder by screws. This bearing being smaller than the body of the threaded parts of the screw and being situated in the centre of the holder, keeps the screw from moving laterally. One-half of the screw is threaded with a right-hand thread, the other half with a left-hand thread, the holes in the movable jaws being also threaded right-hand and left-hand. The result of this arrangement is that when the thumb screw is turned in one direction the jaws open away from the centre of the holder; when it is turned in the opposite direction the jaws move towards the centre and are capable of coming together at that point. They can hold the thinnest object securely, and whatever is held between them is always in a central position in the holder, and the use of quads for this purpose is done away with.

For the colouring of maps and plans, an air brush has been procured. The air brush is especially useful for colouring photographic enlargements of maps, as the paper used in photographing is often of such a character that it is impossible to put on an even tint in the ordinary way.

Fourth Division—British Columbia Surveys.

Most of the surveys in British Columbia were made by the regular surveyors, Messrs. J. E. Ross and A. W. Johnson. Both worked in winter, as well as in summer, in order to take advantage of weather conditions favourable to surveying operations in the various localities.

In addition to the work of the regular surveyors, a few returns have been received of surveys made for private individuals and of other small surveys.

The British Columbia section of the staff which, for three years, occupied quarters on Sparks street separated from the main office, was this year transferred to the space in the Surveyor General's office formerly occupied by the geographer's staff. This facilitates the work of the staff, the returns and information required for reference being more readily accessible.

The British Columbia surveyors remained so long in the field that their returns were somewhat delayed, and those received entailed more work than usual. As most of the traverse surveys in British Columbia were made for the purpose of establishing section corners and land boundaries, this portion of the work, which will this year contain well over one thousand courses, has to be carefully checked by latitudes and departures.

Forty-five township plans have been compiled, and three hundred and four miscellaneous plans and tracings have been made.

Fifth Division—Mapping.

The work of this division is the compilation and drawing of any maps that may be required. The staff has been engaged principally on the 'sectional sheets,' adding new surveys and other information and preparing them for new editions. Much new compilation has been added to the sectional sheets covering the railway belt in British Columbia so as to show the topography, not only within the railway belt, but also outside of it to the full size of the sheet. The sheets which extend over the west boundary of Alberta into British Columbia are also being added to, in the same way.

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The compilation of the surveys of mineral claims in the Yukon Territory, showing their position on the general map on a scale of 40 chs. to an inch, has been kept up, but the number of lots so recorded has been very small compared with previous years.

SURVEY RECORDS' OFFICE.

A large portion of the survey records staff has been employed copying plans which have been out of print, and which were required by agents, land guides and companies in placing settlers on their lands.

Homestead maps, on a scale of one mile to an inch, showing the homesteads open for entry in the western provinces, have been completed and forwarded to the different sub-agents.

The amount of correspondence necessary to supply the largely increased demand for township plans was, on an average, between twenty-five and thirty letters per day.

The plans and files in connection with reservations of right of way for roads and railways in the provinces of Manitoba, Saskatchewan and Alberta, have greatly increased the work of this office. All these plans and files are recorded here. Every railway right of way plan is on file and the reservations for the right of way in the lands affected are noted. The correspondence in this connection, averaging between fifteen and twenty letters per day, goes through this branch.

The Eclipse Manufacturing company completed the cases, and finished all the other changes necessitated by their removal to their new quarters in the Canadian building. The printed plans of the parishes, settlements and town plots, were removed to their new places and re-indexed; this new arrangement does much to economize the time required for finding them.

A complete index of all the plans west of the fifth meridian, showing the character of the survey and the name of the surveyor for all original plans, has been compiled and has proved a valuable aid to ready reference.

The increase of work during the year has been so large that it is only by using the greatest care in indexing and arrangement that the present staff is able to keep pace with it.

PHOTOGRAPHIC OFFICE.

In presenting the report of the photographic office, it is interesting to note that the total amount of work executed during the nine months exceeded that executed during the twelve months ending June 30, 1906.

There is a large increase in the number of township plans, over one hundred having been reproduced in the month of January alone.

The dry plate work and the bromide enlarging have also greatly increased.

Hitherto the Geological Survey parties have, to a large extent, employed sketching for their surveys, but now they are beginning to use photography, which they find quicker and more satisfactory. Last season only one of their parties used photography, while this season it is expected that four or five will be equipped with the necessary photographic outfits. From the negatives, bromide enlargements are made in this office. This greater use of photography is the cause of the large increase in the number of bromide enlargements.

Considerable time has been spent on special work. The photo-lithographing of a section of Nelson river showing the proposed Hudson Bay railway, is a fair example of the use that can be made of photography in map making. This map was enlarged from a thirty-five mile scale to a twenty-five mile scale. Another interesting piece of work was the enlargement of part of Alberta, Saskatchewan and the Northwest Territories, from a thirty-five mile scale to a twelve mile scale. This work, which occupied only one week, would take at least three months if done by draughting.

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The staff consists of one photographer in charge, one general photographer with three assistants, and one photo-lithographer and photo-engraver with two assistants.

Besides the development, printing and enlargement of the views taken by surveyors in the field, they have to copy, reduce and enlarge to proper scale the plans and maps used in compilations, to photograph the plans and maps sent in for reproduction and to prepare zincplates or transfers of the same. The photographic work of the Geological Survey Department has also been done here. A schedule of the work executed is given as appendix No. 9.

LITHOGRAPHIC OFFICE.

There has been no change in the method of doing the work in this office.

The statement of the work executed, given as appendix No. 10 to this report, shows a decrease in the number of maps printed but a decided increase in the number of the township plans.

The number of the staff is the same as last year; it consists of one foreman, one transferer, one power press printer and one press feeder.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

The regular annual meeting of the board was held at Ottawa, beginning on the second Monday in February, 1907 (February 11), as directed by clause 101 of the Dominion Lands Act, and was continued until March 2. Special meetings were held on July 19, 1906, and March 21, 1907.

During the February meeting examinations were held simultaneously in Ottawa, Toronto, Winnipeg and Calgary. Professor L. B. Stewart, D.T.S., of the School of Practical Science, presided at the examination in Toronto; Mr. J. Lonsdale Doupe, D.L.S., in Winnipeg, and Mr. A. O. Wheeler, D.L.S., in Calgary.

It had also been arranged to hold a special examination at the same time in Vancouver, under Mr. E. B. Hermon, D.L.S., but the candidates did not present themselves.

Fifteen candidates passed the examination for admission as articled pupil, as follows:—

- M. H. Baker, St. Thomas, Ont.
- T. W. Brown, Alberton, Ont.
- L. S. Cokely, Lethbridge, Alta.
- A. S. Cram, Ottawa, Ont.
- G. H. Ferguson, Toronto, Ont.
- L. F. Heuperman, Edmonton, Alta.
- W. G. McElhanney, Ottawa, Ont.
- E. W. Murray, Seaforth, Ont.
- J. L. Rannie, Toronto, Ont.
- A. Roger, Ottawa, Ont.
- A. H. D. Ross, Ottawa, Ont.
- Alan Stewart, Ottawa, Ont.
- A. G. Stuart, Montreal, P.Q.
- A. H. Swinburn, Ottawa, Ont.
- E. O. Wheeler, Calgary, Alta.

Fourteen candidates passed the final examination for admission as surveyor, as follows:—

- N. A. Burwash, Toronto, Ont.
- C. A. Chilver, Walkerville, Ont.
- P. C. Coates, Toronto, Ont.

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S. R. Crerar, Toronto, Ont.
 C. H. Fullerton, New Liskeard, Ont.
 P. Gillespie, Toronto, Ont.
 W. T. Green, Ottawa, Ont.
 G. B. McColl, Winnipeg, Man.
 D. H. Nelles, Ottawa, Ont.
 D. T. Townsend, Toronto, Ont.
 J. E. Umbach, Ottawa, Ont.
 W. H. Waddell, Hamilton, Ont.
 J. Waldron, Pine Grove, Ont.
 E. W. Walker, Regina, Sask.

Oaths of office and of allegiance and bonds for the sum of one thousand dollars each, as required by clause 115 of the Dominion Lands Act, were received from eleven candidates who had previously passed the necessary examinations for commissions as Dominion land surveyors and had complied with the other requirements of the Act.

Ten commissions as Dominion land surveyors were issued, as follows:—

E. R. Bingham, Toronto, Ont.
 N. A. Burwash, Toronto, Ont.
 C. A. Chilver, Walkerville, Ont.
 S. R. Crerar, Toronto, Ont.
 W. T. Green, Ottawa, Ont.
 J. D. McLennan, Ottawa, Ont.
 G. B. McColl, Winnipeg, Man.
 D. H. Nelles, Ottawa, Ont.
 D. T. Townsend, Toronto, Ont.
 J. E. Umbach, Ottawa, Ont.

Every Dominion land surveyor is required by clause 125 of the Dominion Lands Act, to be in possession of a subsidiary standard measure furnished by the secretary of the board of examiners. Nine such standards were issued during the year.

A list of surveyors who have been furnished with standard measures up to March 31, 1907, will be found in appendix No. 3.

The correspondence of the board amounted to:

Letters, &c., received..	571
Letters sent..	435

The examination questions used at the examination in February, 1907, are submitted as appendix No. 12.

Synopsis of the Work of the Board.

The meeting of July 19, 1906, was a special meeting called to pass the necessary resolution admitting J. D. McLennan as a Dominion land surveyor, his commission having been withheld until the completion of his term of apprenticeship.

Previous to the annual meeting in February sets of question papers for the various examinations were prepared by the members of the board. At this meeting the answers of three candidates at the limited preliminary examination, seventeen at the full preliminary examination, nineteen at the final D.L.S. examination, and one at the D.T.S. examination were examined.

Some discussion took place on the regulation made at the meeting in May, 1906, whereby candidates obtaining 75 per cent or more on any subject are not required to write on such subject if they present themselves again. It was felt that from such candidates a higher percentage should be required than from those coming up for the first time. No action in the matter was taken at this meeting.

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The question of who are eligible for examination under clause 111 of the Dominion Lands Act, having come up, it was decided that in future the secretary should accept articles for one year's service only from graduates of colleges and universities who hold proper diplomas.

Considerable time was taken up in discussing the regulations governing the examination for certificate as Dominion topographical surveyor; and the schedule of studies was re-arranged. It was agreed that before the next meeting a brief statement should be prepared setting forth the work to be covered in each subject of this examination, and a list of the books to be used in preparing for it. The work was divided among the members of the board, Dr. Deville taking three subjects, and Dr. Klotz and Dr. King four subjects each.

A resolution was passed fixing the percentage of marks required to pass any examination at 50 per cent in each subject, and allowing candidates who obtain the required 50 per cent in certain subjects, but fail in other subjects, to take supplementary examinations.

A special meeting of the board was held on March 21, at which the curriculum of studies for the D.T.S. examination was further considered and a list of text books prepared.

A resolution was also passed allowing candidates whose term of service at the time of examination is within three weeks of completion to write on such examination, provided that field work is complete at the time of writing. Commissions in such cases will be withheld until the completion of the full term of apprenticeship of one year or three years, as the case may be.

APPENDICES.

The following schedules and statements are appended:—

No. 1. Schedule of surveyors employed and work executed by them, from July 1, 1906, to March 31, 1907.

No. 2. Schedule showing for each surveyor employed from Jan. 1, 1906, to Mar. 31, 1907, the number of miles surveyed, of township section lines, township outlines, traverses of lakes and rivers, and resurvey; also cost of same.

No. 3. List of Dominion land surveyors who have been supplied with standard measures.

No. 4. List of lots in the Yukon Territory surveys of which have been confirmed from July 1, 1906, to March 31, 1907.

No. 5. List of miscellaneous surveys in the Yukon Territory returns of which have been received during the nine months ending March 31, 1907.

No. 6. Statement of work executed in the office of the chief draughtsman.

No. 7. List of sectional maps revised, printed, reprinted and revised and reprinted from July 1, 1906, to March 31, 1907.

No. 8. Statement of work executed in the survey records office for the nine months ending March 31, 1907.

No. 9. Statement of work executed in the photographic office during the nine months ending March 31, 1907.

No. 10. Statement of work executed in the lithographic office during the nine months ending March 31, 1907.

No. 11. Names and duties of employees of the Topographical Surveys Branch at Ottawa.

No. 12. Examination papers of the Board of Examiners for Dominion land surveyors.

Nos. 13 to 45. Reports of the surveyors employed.

No. 46. Descriptions of surveyed townships submitted by Dominion land surveyors during the nine months ending March 31, 1907.

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MAPS.

The following maps accompany this report:—

1. Diagram showing closings on base lines between the fifth and sixth meridians.
2. Mr. P. G. Stewart's exploration on the west side of the Canadian Northern railway from Etoimami to The Pas; to accompany his report.
3. Sketch map showing country near fourteenth base line, province of Saskatchewan, to accompany the report of J. N. Wallace, D.L.S.
4. Map to accompany J. W. McLaggan's report of exploration in Saskatchewan and the Northwest Territories.
5. Mr. A. D. Moodie's exploration from Etoimami to The Pas; to accompany his report.
6. Topographical survey of Canada—trigonometrical section. Triangulation in British Columbia. To accompany the report of P. A. Carson, D.L.S.

I have the honour to be, sir,

Your obedient servant,

E. DEVILLE,
Surveyor General.

APPENDICES

TYPOGRAPHICAL SURVEYS BRANCH.
 SCHEDULES AND STATEMENTS.

APPENDIX No. 1.

SCHEDULE of Surveyors employed and work executed by them from July 1, 1906 to March 31, 1907.

Surveyor.	Address.	Description of work.
Aylsworth, C. F....	Madoc, Ont....	Re-survey of township 10 range 7, township 14 range 8, parts of townships 14 and 16 range 7, and parts of townships 15 ranges 7 and 8, all east of the principal meridian.
Baker, J. C.....	Vermilion, Alta.	Contract No. 14 of 1906 ; subdivision of township 59 range 20, township 58 range 21, and townships 61 ranges 25, 26 and 27, all west of the fourth meridian.
Beatty, David	Parry Sound, Ont.	Correction survey in townships 51 ranges 27 and 28 west of the second meridian. Retracement surveys in the following townships west of the third meridian ;—township 38 range 13, townships 45 ranges 9 and 10, townships 41, 42, 43 and 44 ranges 10 and 11, and townships 49 and 50 range 1. Retracement surveys in townships 50 ranges 26, 27 and 28 west of the second meridian.
Belanger, P. R. A....	Ottawa, Ont....	Inspection of contracts No. 18 of 1905 and Nos. 11 and 12 of 1906. Restoration survey in the following townships west of the second meridian ;—townships 24 ranges 1, 13, 14 and 15, townships 25 ranges 12, 14, 15 and 16, townships 26 ranges 12, 13 and 15, township 27 range 7, townships 28 ranges 6 and 13, townships 29 ranges 13, 14 and 15, township 30 range 13, townships 31 ranges 12 and 13 and townships 32 ranges 9, 10 and 11. Restoration survey in the following townships, west of the principal meridian ;—township 5 range 34, townships 6 ranges 30, 32 and 34, townships 7 and 8 ranges 32 and 34, township 24 range 29, township 26 range 28 and townships 30 and 32 range 29.
Bolton, Lewis.....	Listowel, Ont.....	Contract No. 3 of 1906 ; subdivision of townships 3 and 4 ranges 13 and 14, east of the principal meridian.
Bourgeault, A.....	St. Jean Port Joli, Que.	Contract No. 11 of 1906 ; subdivision of townships 30 and 31 ranges 15 and 16, parts of township 30 range 14, and township 29 range 15, all west of the second meridian.
Bray, L. T.	Amherstburg, Ontario.	Re-survey in township 11 range 22, and subdivision in townships 1, 2, 3 and 4 range 30, west of the fourth meridian. Subdivision in townships 1 and 2 range 1, in township 5 range 2, in townships 6, 7, 8 and 9 range 3, in township 7 range 4, and in township 8 range 6, all west of of the fifth meridian
Carson, P. A	Ottawa, Ont....	Triangulation surveys in British Columbia, in connection with the Trigonometrical Section of the Topographical Survey of Canada.
Cautley, R. W.....	Edmonton, Alta.....	Survey of the seventeenth base line across ranges 17 to 27 inclusive, west of the fourth meridian.
Cautley, R. H	Edmonton, Alta	Contract No. 16 of 1906 ; subdivision in townships 57, 58, 59 and 60 range 5, west of the fifth meridian.
Christie, Wm.....	Chesley, Ont.....	Re-survey in township 17 range 1, in township 18 range 2, in townships 19 and 20 ranges 3, 4 and 5, and in township 20 range 6: re-survey of part of the outlines of township 16 range 1, of township 19 range 6, of township 18 range 3 and of township 17 range 2, all west of the principal meridian.

APPENDIX No. 1.—Schedule of Surveyors employed and work executed by them from July 1, 1906, to March 31, 1907.—*Continued.*

Surveyor.	Address.	Description of work.
Deans, W. J.	Brandon, Man.	Subdivision in township 16 range 4, in townships 15, 16, 17 and 18 range 10, and in townships 14, 15, 16, 17 and 18 range 11 all west of the principal meridian. Re-survey of township 7 range 27, of townships 5, 6, 7 and 8 range 28 and of townships 5, 6, 7, 8 and 9 range 29, all west of the principal meridian. Re-survey of part of township 7 range 9, west of the second meridian. Miscellaneous surveys in township 17 range 21, west of the principal meridian.
Doupe, Jos.	Winnipeg, Man.	Re-survey in township 6, range 14 west of the second meridian.
Drummond, Thos.	Montreal, Que.	Contract No. 17 of 1906 ; subdivision of townships 57, 58, 59 and 60 range 6, west of the fifth meridian.
Dumais, P. T. C.	Hull, Que.	Contract No. 9 of 1906 ; subdivision of townships 26 ranges 12, 13 and 14, townships 25 and 26 range 10, and township 23 range 14, west of the principal meridian. Re-survey of townships 25 and 26 range 11, west of the principal meridian.
Edwards, Geo.	Ponoka, Alta.	Contract No. 13 of 1906 ; subdivision of townships 11 and 12 range 11 ; partial subdivision of townships 10 and 11 range 13, and townships 7, 8, 9, 10 and 11 range 1, west of the third meridian ; survey of the east outline of townships 9 and 10 ranges 11 and 12 and of townships 5, 6, 7 and 8 range 2, west of the third meridian.
Fairchild, C. C.	Brantford, Ont.	Subdivision in townships 25, 26 and 27 range 11, in townships 25, 26, 27 and 28 range 12, and in township 24 range 8, all west of the fifth meridian. Miscellaneous work near Banff, Alta.
Fawcett, Thos	Niagara Falls, Ont.	Contract No. 20 of 1906 ; subdivision of townships 56, 57, 58 and 59 range 4, west of the fifth meridian.
Fontaine, L. E.	Lévis, Que.	Re-survey of township 42 range 27, west of the third meridian. Miscellaneous surveys in townships 41 and 42 range 1, in township 43 range 3, in township 37 range 4, in township 47 range 5, in townships 43, 44 and 47 range 6, in township 40 range 8, in townships 41 and 42 range 9, in township 44 range 10, in township 38 range 14, and in townships 39 ranges 15 and 16, all west of the fourth meridian. Re-survey of township 50 range 3 west of the fifth meridian. Inspection of contracts Nos. 5 and 22 of 1906.
Grover, Geo. A.	Toronto, Ont.	Re-survey of township 18 range 1, east of the principal meridian. Re-survey of townships 19 and 20 ranges 1 and 2, and of townships 22 ranges 7 and 8, west of the principal meridian. Inspection of contracts Nos. 3, 4, 5, 6, 7, 8 and 10 of 1906.
Hawkins, A. H.	Listowel, Ont.	Subdivision of township 2 range 29 west of the third meridian. Re-surveys in townships 1 ranges 12 and 13, in township 2 range 13, in townships 6 and 7 range 17, in townships 10 and 11 range 22 and in township 13 range 29, all west of the fourth meridian. Re-survey of outlines of townships 1 and 2 range 8, of townships 1, 2, 3 and 4 range 9, of townships 1 ranges 10, 11 and 14, of township 2 range 14 and of township 10 range 24, all west of the fourth meridian. Survey of part of the south outline of township 3 range 29 west of the third meridian.
Holcroft, H. S.	Toronto, Ont	Contract No. 10 of 1906 ; subdivision of township 7 range 9 and townships 6, 7, and 8 range 10, all east of the principal meridian. Subdivision of townships 7 and 8 ranges 27, 28, 29 and 30 west of the second meridian. Survey of the east outline of township 6 range 30, west of the second meridian.
Hopkins, M. W.	Edmonton, Alta.	Contract No. 23 of 1906 ; subdivision of townships 59 and 66 ranges 7, 8, 9 and 10, all west of the fourth meridian.
Hubbell, E. W.	Ottawa, Ont	Re-survey in township 22 range 1, in townships 21 and 22 range 2, in townships 21, 22 and 23 range 3, in townships 21 and 22 range 4, in townships 21 and 22 range 5, in townships 21 ranges 6 and 7 and in townships 21 and 22 range 8, all west of the third meridian. Re-survey in township 27 range 24, in township 24 range 28, in townships 18 and 19 range 29, and in townships 26 and 29 range 25, all west of the second meridian. Inspection of contracts Nos. 13 and 25 of 1906.

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APPENDIX No. 1.—Schedule of Surveyors employed and work executed by them from July 1, 1906, to March 31, 1907.—*Continued.*

Surveyor.	Address	Description of Work.
Jephson, R. J	Winnipeg, Man. . .	Miscellaneous surveys in townships 44 and 45 range 28 west of the principal meridian and in township 44 range 3 west of the second meridian.
Johnson, A. W.	Kamloops, B.C. . . .	Subdivision in townships 1, 2, 3, 4 and 5 range 26, in township 1 range 27, in townships 2 and 3 range 24, in townships 2 and 4 range 25, in township 3 range 23, in townships 3 ranges 28 and 29, in township 4 range 28 and in township 15 range 27, all west of the sixth meridian. Subdivision in township 19 east of the coast meridian. Traverses in township 2 range 25, in townships 3 ranges 23, 24, 25 and 26, in townships 4 ranges 24, 25 and 26, in townships 5 ranges 25 and 26, in township 15 range 27, and in township 3 range 28, all west of the sixth meridian. Traverses in townships 19 and 20 east of the coast meridian.
Kirk, J. A.	Revelstoke, B.C.	Double traverse of Blaeberry creek valley from the mouth to the northern limit of the railway belt, and part subdivision of township 28 range 22 west of the fifth meridian.
Knight, R. H.	Edmonton, Alta.	Contract No. 21 of 1906 ; subdivision of townships 50 and 51 ranges 5 and 6, and townships 54 and 55 range 7, all west of the fifth meridian.
Lonergan, G. J.	Buckingham, Que. . . .	Re-surveys in townships 51 ranges 2 and 3 west of the fifth meridian and in townships 56 ranges 22 and 24 west of the fourth meridian. Correction surveys in townships 58 and 59 range 22 west of the fourth meridian. Miscellaneous surveys in township 59 range 23, in townships 59 ranges 17 and 18, in township 52 range 12, in township 60 range 14 and in township 55 range 4, all west of the fourth meridian ; and in township 53 range 28 west of the third meridian. Subdivision in township 51 range 20 west of the fourth meridian. Correction survey at Fort Saskatchewan. Survey of outlines of township 56 range 25, of township 49 range 1, of township 57 range 14, all west of the fourth meridian. Survey of outlines of townships 53 and 54 ranges 27 and 28 west of the third meridian. Inspection of contract No. 23 of 1906.
Laurie, R. C.	Battleford, Sask. . . .	Re-survey of the townsite of South Battleford.
Macdonell, J. A.	Winnipeg, Man.	Exploration survey of three and a half million acres, grant to the Dominion Government "in that portion of the Peace river district of British Columbia lying east of the Rocky mountains and adjoining the province of Alberta."
MacLennan, A. L. . . .	Toronto, Ont.	Subdivision in townships 11 and 12 range 3, and in townships 10 and 11 range 4, and survey of the east outline of township 12 range 4, all west of the fifth meridian.
McFarlane, W. G. . . .	Toronto, Ont.	Contract No. 5 of 1906 ; subdivision of townships 34 and 35 range 22, townships 28 and 32 range 23, townships 24 and 35 range 25, and township 35 range 26, all west of the principal meridian. Subdivision of townships 7 and 8 ranges 14, 15 and 16, townships 6 ranges 13, 14, 15 and 16, township 7 range 13, and townships 3 ranges 12 and 13, all west of the fourth meridian.
McFee, A.	Innisfail, Alta.	Contract No. 22 of 1906 ; subdivision of township 28 range 18, and townships 35 ranges 14, 15 and 16, all west of the fourth meridian. Traverse in township 35 range 2 west of the fifth meridian.
McGrandle, Hugh. . .	Wetaskiwin, Alta. . . .	Contract No. 18 of 1906 ; subdivision of townships 58 and 59 range 7 ; surveys of outlines in townships 57, 59 and 60 range 7, and in township 58 range 5 ; traverse in township 60 range 7, all west of the fifth meridian.
McLaggan, J. W. . . .	Strathcona, Alta.	Exploratory survey in the province of Saskatchewan and in Keewatin territory northeasterly from The Pas.
McMillan, Geo.	Ottawa, Ont.	Inspection of contracts Nos. 12, 15, 17, 19 and 20 of 1905 and contracts Nos. 1, 14, 15, 16 and 21 of 1906. Traverses in townships 59 and 60 range 11, west of the fourth meridian.
Michaud, A.	Edmonton, Alta. (Since deceased)	Contract No. 19 of 1906 ; subdivision of townships 54, 55 and 56 range 5, west of the fifth meridian.

APPENDIX No. 1.—Schedule of Surveyors employed and work éxecuted by them from July 1, 1906, to March 31, 1907.—*Continued.*

Surveyor.	Address.	Description of work.
Miles, C. F.	Toronto, Ont.	Subdivision in township 15 range 1, in townships 13, 14 and 15 range 2, in townships 17, 18, 19 and 20 range 3 and in townships 21 and 22 range 4, west of the fifth meridian. Survey of outlines of townships 12 ranges 3 and 4, west of the fifth meridian. Traverse in township 21 range 27, west of the fourth meridian.
Molloy, John.	Winnipeg, Man.	Contracts Nos. 2 and 7 of 1906; subdivision of townships 1 and 2 range 10, townships 1, 2 and 6 range 11, townships 2, 3 and 6 range 12, townships 1, 5 and 6 range 13, townships 5, 6 and 7 range 14 and township 6 range 9; traverse in townships 13 and 14 ranges 12 and 13, all east of the principal meridian.
Montgomery, R. H..	Prince Albert, Sask. . .	Contract No. 12 of 1906; subdivision of townships 50 ranges 22, 23, 24, 25 and 26 and townships 51 ranges 22, 23 and 26 and survey of the east outline of townships 52 ranges 22, 23 and 24, all west of the second meridian. Subdivision of townships 50 ranges 2 and 3, and townships 51 ranges 1 and 2, all west of the third meridian.
Moodie, A. D.	Lakefield, Ont.	Exploration survey of the country between Erwood, Saskatchewan and The Pas, Keewatin along the right of way of the Canadian Northern railway.
O'Hara, W. F.	Ottawa, Ont.	Re-surveys in townships 32, 33 and 34 ranges 21 and 22, and in township 35 range 21 west of the fourth meridian. Miscellaneous surveys in township 38 range 28 west of the fourth meridian, and in township 38 range 1, west of the fifth meridian. Subdivision in township 5 range 3, west of the fifth meridian.
Parsons, J. L. R. . . .	Winnipeg, Man.	Contracts No. 6 of 1906 and No. 3 of 1907; subdivision of townships 9 ranges 10 and 11, township 10 range 9 and townships 15 and 16 ranges 14 and 15, all east of the principal meridian; subdivision of townships 23 and 24 ranges 4, 6 and 7; subdivision in township 29 range 10, and survey of part of the outlines of township 28 range 10, all west of the principal meridian.
Reilly, W. R.	Regina, Sask.	Re-surveys in townships 33 and 34 ranges 1 and 2, in townships 38 ranges 1, 2 and 3, in township 37 range 1 and in township 35 range 6, all west of the third meridian. Re-surveys in townships 41 and 42 range 28, west of the second meridian. Partial re-surveys in township 34 range 6, west of the third meridian and in townships 41 and 42 range 28 west of the second meridian.
Richard, J. F.	Ste. Anne de la Pocatière, Que.	Settlement surveys at The Pas, Cumberland House and Big Eddy.
Rinfret, R.	Montreal, Que.	Contract No. 24 of 1906; subdivision of townships 65, 66, 67 and 68 range 13, townships 65, 66, 67 and 68 range 14, and townships 66 and 68 range 15; survey of the east outline of township 65 range 16, all west of the fourth meridian.
Ross, Jos. E.	Kamloops, B. C.	Subdivision surveys in townships 22 ranges 26 and 27, west of the fifth meridian; also in townships 23 ranges 2 and 3, in townships 22 and 23 range 16, in townships 18 and 22 range 17, in townships 17 ranges 17, 18 and 19, in township 16 range 18, and in townships 19 ranges 16, 17 and 18, all west of the sixth meridian. Traverses in townships 19 ranges 16, 17 and 18, in townships 17 and 18 range 17, in township 17 range 18, in townships 22 and 23 range 2, and in townships 21 and 22 range 1, all west of the sixth meridian; also in township 21 range 29 west of the fifth meridian. Surveys on the shores of Shuswap and Mara lakes. Traverse of Columbia river from Beavermouth to the north limit of the railway belt. Traverse of Incomappleux river and Boyd creek trail. Traverse of Huff lake and part of North Thompson river.
Roy, Geo. P.	Quebec, Que.	Contract No. 15 of 1906; subdivision of townships 58 and 59 range 27, west of the fourth meridian, and townships 60 ranges 3 and 4, west of the fifth meridian.

SESSIONAL PAPER No. 25b

APPENDIX No. 1.—Schedule of Surveyors employed and work executed by them from July 1, 1906 to March 31, 1907.—*Concluded.*

Surveyor.	Address.	Description of work.
Saint Cyr, A.. . .	Ottawa, Ont.....	Survey of the seventeenth base line across ranges 19 to 22 inclusive west of the fifth meridian, the eighteenth base line across ranges 1 to 8 inclusive west of the sixth meridian, the twenty-first base line across ranges 21 to 24 inclusive, the twenty-second base line across ranges 21 to 26 inclusive, and the eighteenth base line across ranges 20 to 22 inclusive, west of the fifth meridian.
Saint Cyr, J. B.	Ste. Anne de la Perade, Que.....	Surveys of the Fort Vermilion, North Vermilion and Boyer settlements, in the Peace river district. Re-surveys in townships 6 ranges 25, 26 and 27 west of the principal meridian.
Saunders, B. J.....	Edmonton, Alta.....	Survey of the fourth base line across ranges 13, 14 and part of 15 and the fifth base line across ranges 13 to 17 inclusive, east of the principal meridian.
Selby, H. W..	Toronto, Ont.	Subdivision in township 76 range 15, in townships 74, 75 and 76 range 16 and in townships 73, 74 and 75 range 17, west of the fifth meridian. Survey of part of the outlines of townships 73 ranges 16 and 18 and of township 75 range 15 west of the fifth meridian. Traverse of the southerly boundaries of lots in Heart River and Big Prairie Settlements, Alta.
Stewart, P. G	Britannia Bay, Ont..	Exploration survey of the country between Erwood, Saskatchewan and The Pas, Keewatin along the Canadian Northern railway right of way.
Teasdale, C. M. . . .	Concord, Ont.....	Contract No. 25 of 1906; subdivision of townships 9, 10 and 11 ranges 28, 29 and 30 west of the second meridian. Partial subdivision of township 10 range 4, west of the third meridian.
Thibaudeau, W.	Ottawa, Ont.....	Exploration survey of the country lying between Fort Churchill on Hudson bay and The Pas on Saskatchewan river.
Tyrrell, J. W.....	Hamilton, Ont.....	Contracts Nos. 4 and 27 of 1906; subdivision of townships 7 ranges 11, 12 and 13, township 8 range 11, and townships 16 and 17 ranges 9 and 10, all east of the principal meridian. Survey of the east outline of townships 16 and 17 range 8 and of the north outline of township 15 range 9, all east of the principal meridian.
Wallace, J. N	Calgary, Alta....	Survey of the fourteenth base line between the third and second meridians, and of the second meridian as far north as Saskatchewan river. Survey of lines to connect with "Red Earth" and "Shoal Lake" Indian reserves.
Warren, Jas	Walkerton, Ont.....	Re-surveys in townships 21 and 22 ranges 27 and 28, west of the third meridian. Retracement surveys in townships 11 and 12 ranges 25 and 26, in townships 14 ranges 19 and 30, in township 16 range 15 and in township 19 range 24, all west of the second meridian.
Watt, Geo. H.....	Ottawa, Ont.....	Contract No. 8 of 1906; subdivision of townships 14 and 15 range 10, and township 14 range 9; partial subdivision of township 15 range 9, all east of the principal meridian.
Wheeler, A. O	Calgary, Alta....	Topographer of the Department of the Interior. Phototopographical surveys from Mts. Douglas and Drummond near Red Deer river, to the Beaverfoot range.

APPENDIX No. 2.

SCHEDULE showing for each surveyor employed from January 1, 1906, to March 31, 1907, the number of miles surveyed, of township section lines, township outlines, traverses of lakes and rivers and re-survey ; also the cost of same.

Surveyor.	Miles of Section Lines.	Miles of Outlines	Miles of Traverse.	Miles of Re-survey.	Total Mileage.	Total Cost.	Cost per Mile.	By Day Work or by Contract.
						\$ cts.	\$ cts.	
Aylsworth, C. F.....				239	239	7,143 00	29 88	Day.
Baker, J. C.....	234	18	56		308	8,270 27	26 85	Contract.
Beatty, David.....				484	484	6,700 00	13 84	Day.
(b) Belanger, P. R. A.				48	48	5,847 72		"
Bolton, Lewis.....	199		26		225	6,334 00	28 15	Contract.
Bourgeault, A.	198	11	36	30	275	7,133 00	25 94	"
Bray, L. T.....	87	12		70	169	6,052 61	35 81	Day.
Cautley, R. W.....		120			120	7,528 91	62 74	"
Cautley, R. H.....	192	25	58		275	7,284 00	26 49	Contract.
Christie, Wm.....			142	339	481	6,825 81	14 19	Day.
Deans, W. J.....	201	32	20	651	904	7,023 88	7 77	"
Doupe, Jos.....	4				4			"
Drummond, T.....	194	24	67		285	7,586 60	26 62	Contract.
Driscoll, A.....	33	24	14		71	2,243 85	31 60	"
Dumais, P. T. C.....	66	6			72	2,533 00	35 18	"
Edwards, Geo.....	535	49			584	4,434 00	7 59	"
Fairchild, C. C.....	68	12	27	3	110	5,905 48	53 69	Day.
Fawcett, T.....	185	12	61		258	6,956 00	26 96	Contract.
(b) Fontaine, L. E.....			10	73	83	8,189 09		Day.
(b) Grover, Geo. A.....			7	179	186	7,019 61		"
Hawkins, A. H.....		18	3	305	326	5,903 66	18 11	"
Holcroft, H. S.....	575	42			617	10,506 00	17 03	Contract.
Hopkins, M. W.....	383	12	152		547	11,875 56	21 71	"
(b) Hubbell, E. W.....				703	703	9,048 26		Day.
Jephson, R. J.....	16		13		29	579 00	19 97	Contract.
Johnson, A. W.....	61		60	17	138	12,242 97	88 72	Day.
Kirk, J. A.....	3		49		52	629 00	12 10	Contract.
Knight, R. H.....	165	2	62		229	6,462 00	28 22	"
(b) Lonergan, G. J.....	27	2	13	219	261	8,409 13		Day.
MacLennan, A. L.....	14	6	11		31	2,816 00	90 84	"
MacLennan, A. L.....	29	5	20		54	1,296 00	24 00	Contract.
McFarlane, W. G.....	837	6			843	10,839 00	12 86	"
McFee, A.	153	1	61		215	1,806 00	8 40	"
McGrandle, H.....	79	36	6		121	3,325 00	27 48	"
(a) McMillan, Geo.....			4		4	7,037 06		Day.
Michaud, A.....	235	8	43		286	8,184 00	28 62	Contract.
Miles, C. F.....	212	19	1		232	8,020 57	34 58	Day.
Molloy, John.....	838	60	51	12	961	27,957 00	29 09	Contract.
Montgomery, R. H.....	507	60	23	1	591	17,297 00	29 27	"
O'Hara, W. F.....	12			217	229	7,631 88	33 33	Day.
Parsons, J. L. R.....	697	24	104	54	879	23,458 00	26 67	Contract.
Ponton, A. W.....		110			110	7,385 35	67 14	Day.
Reilly, W. R.....			92	710	802	7,560 30	9 43	"
Richard, J. F.....			25		25	2,000 00	80 00	"
Rinfret, R.....	294	63	159		516	10,320 00	20 00	Contract.
Ross, J. E.....	103	16	104	28	251	7,705 79	30 70	Day.
Roy, G. P.....	294	28	75		397	9,424 00	23 74	Contract.
Saint Cyr, A.....		146			146	16,434 00	112 56	Day.
Saint Cyr, J. B.....			106	50	156	3,951 50	25 33	"
Saunders, B. J.....		46			46	9,034 00	196 39	"
Selby, H. W.....	246	84	7		337	10,867 00	32 25	"
Teasdale, C. M.....	394		59		453	3,603 00	7 95	Contract.
Tyrrell, J. W.....	502	30	8	24	564	17,162 00	30 43	"
Wallace, J. N.....		133	6	13	152	16,764 69	110 29	Day.
Warren, Jas.....			5	467	472	3,850 65	8 16	"
Watt, G. H.....	90	4	2	12	108	3,222 72	29 84	Contract.
Total.....	9,862	1,306	1,848	4,948	17,064	435,618 32	24 72	

(a) Inspector of contract surveys. (b) Inspecting contract surveys a portion of the season.

Total cost.....	\$435,618 32
" Mileage.....	17,064 00
Cost per mile.....	\$ 24 72

SESSIONAL PAPER No. 25b

APPENDIX No. 3.

LIST of Dominion Land Surveyors who have been supplied with Standard Measures.

Name.	Address.	Date of Appointment.	Remarks.
Austin, G. F.	Dewdney, Alta.	April 14, '72	
Aylen, J.	Aylmer, Que.	May 29, '85	
Aylsworth, C. F.	Madoc, Ont.	" 17, '86	
Baker, J. C.	Vermilion, Alta.	" 18, '06	
Barwell, C. S. W.	Dawson, Yukon Territory	Aug. 21, '94	
Bayne, G. A.	Winnipeg, Man.	April 14, '72	
Beatty, D.	Parry Sound, Ont.	" 14, '72	
Beatty, W.	Delta, Ont.	" 14, '72	
Belanger, P. R. A.	Ottawa, Ont.	May 17, '80	Topog. Surveys Branch Dept. o Interior.
Belleau, J. A.	"	" 15, '83	Topog. Surveys Branch Dept. of Interior.
Bigger, C. A.	"	Mar. 30, '82	Astronomer, Dept. of Interior.
Bolton, L.	Listowel, Ont.	April 14, '72	
Boswell, E. J.	Winnipeg, Man.	Feb. 18, '03	
Bourgeault, A.	St. Jean Port Joli, Que.	Mar. 29, '83	
Bourgault, C. E.	" "	Feb. 21, '88	
Bourget, C. A.	Levis, Que.	May 14, '84	
Bowman, H. J.	Berlin, Ont.	Feb. 16, '88	
Brabazon, A. J.	Ottawa, Ont.	May 12, '82	
Brady, J.	Golden, B.C.	April 14, '72	
Bray, S.	Ottawa, Ont.	Nov. 14, '83	Dept. of Indian Affairs.
Bray, E.	Oakville, Ont.	April 14, '72	
Bray, L. T.	Amherstburg, Ont.	Feb. 18, '03	
Bridgland, M. P.	Calgary, Alta.	Mar. 10, '05	Topog. Surveys Branch Dept. of Interior.
Brodie, S.	Fort Qu'Appelle, Sask.	April 14, '72	
Brownlee, J. H.	Victoria, B. C.	" 15, '87	
Burke, W.	Minnedosa, Man.	" 14, '72	
Burnet, H.	Victoria, B.C.	June 22, '85	
Burwash, N. A.	Whitehorse, Yukon Territory..	Mar. 6, '07	
Burwell, H. M.	Vancouver, B.C.	Feb. 17, '87	
Carbert, J. A.	Medicine Hat, Alta.	May 12, '80	
Carpenter, H. S.	Regina, Sask.	Feb. 20, '01	Dept. of Public Works for Sas- katchewan.
Carroll, C.	Prince Albert, Sask.	April 14, '72	
Carson, P. A.	Ottawa, Ont.	Feb. 22, '06	Topog. Surveys Branch Dept. of Interior.
Cautley, R. H.	Edmonton, Alta.	May 1, '05	
Cautley, R. W.	"	Sept. 2, '96	
Cavana, A. G.	Orillia, Ont.	Nov. 16, '76	
Charlesworth, L. C.	Edmonton, Alta.	Feb. 27, '03	Dept. of Public Works for Alberta.
Christie, W.	Chesley, Ont.	Mar. 22, '06	
Cleveland, E. A.	Vancouver, B.C.	June 27, '99	
Côté, J. A.	Quebec, Que.	May 14, '84	
Côté, J. L.	Edmonton, Alta.	Mar. 21, '90	
Cotton, A. F.	New Westminster, B.C.	May 11, '80	
Craig, J. D.	Ottawa, Ont.	Feb. 24, '02	Boundary Surveys, Dept. of Int.
Cummings, J. G.	Calgary, Alta.	" 17, '04	
Dalton, J. J.	Weston, Ont.	April 17, '79	Dominion Topographical Surveyor.
Deans, W. J.	Brandon, Man.	May 13, '86	
Dennis, J. S.	Calgary, Alta.	Nov. 19, '77	Dominion Topographical Surveyor, Inspector of Irrigation and British Columbia Land Com- missioner, C.P.R.
Denny, H. C.	"	April 1, '82	
Dickson, H. G.	Whitehorse, Yukon Territory..	May 19, '89	
Dickson, J.	Fenelon Falls, Ont.	April 14, '72	
Dobie, J. S.	Regina, Sask.	Mar. 22, '06	Dept. of Public Works for Sas katchewan.

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APPENDIX No. 3 —List of Dominion Land Surveyors who have been supplied with Standard Measures.—*Continued.*

Name.	Address.	Date of Appointment.	Remarks.
Doupe, J.	Winnipeg, Man.	April 14, '72..	Asst. Land Commissioner C.P.R.
Doupe, J. L.	"	Oct. 6, '88..	
Drewry, W. S.	New Denver, B.C.	Nov. 14, '83..	Dominion Topographical Surveyor.
Driscoll, A.	Edmonton, Alta	Feb. 23, '87..	
Drummond, T.	Montreal, Que.	June 24, '78..	Swamp Land Commissioner.
Ducker, W. A.	Winnipeg, Man.	Mar. 30, '83..	
Dumais, P. T. C.	Hull, Que.	" 29, '82..	Dominion Topographical Surveyor.
Edwards, Geo.	Ponoka, Alta.	April 14, '72..	
Ellacott, C. H.	Regina, Sask.	Feb. 22, '99..	Dominion Topographical Surveyor.
Fairchild, C. C.	Brantford, Ont.	" 20, '01..	
Farncomb, A. E.	Red Deer, Alta.	Mar. 12, '02..	Dominion Topographical Surveyor.
Fawcett, T.	Niagara Falls, Ont.	Nov. 18, '76..	
Fawcett, A.	Gravenhurst, Ont.	Feb. 22, '93..	City Surveyor, Winnipeg.
Fontaine, L. E.	Levis, Que.	Aug. 13, '92..	
Foster, F. L.	Toronto, Ont.	April 14, '72..	Topographical Surv. Br., Dep. of Int. President of the D. L. S. Association.
Francis, J.	Poplar Point, Man.	June 17, '75..	
Garden, J. F.	Vancouver, B. C.	May 13, '80..	Dominion Topographical Surveyor, Chief Astronomer, Dept of Interior.
Garden, G. H.	Lethbridge, Alta.	April 14, '72..	
Garden, C.	Winnipeg, Man.	" 14, '72..	Dominion Topographical Surveyor, Chief Astronomer, Dept. of the Interior.
Gauvreau, L. P.	Riviere du Loup, Que.	" 14, '72..	
Gibbon, J.	Dawson, Yukon Territory	Feb. 12, '91..	Chief Engineer Transcontinental Railway.
Gordon, M. L.	Toronto, Ont.	" 18, '04..	
Gordon, R. J.	Stirling, Alta.	Mar. 12, '02..	Director of Surveys Y. T.
Gore, T. S.	Victoria, B.C.	April 19, '79..	
Green, T. D.	Dawson, Yukon Territory	May 19, '84..	Dominion Topographical Surveyor, Land Commissioner, Alberta Railway and Coal Co.
Grover, G. A.	Toronto, Ont.	Feb. 18, '04..	
Harris, J. W.	Winnipeg, Man.	April 14, '72..	District Surveyor and Town Engineer.
Harvey, C.	Indian Head, Sask.	Feb. 17, '04..	
Hawkins, A. H.	Listowel, Ont.	Mar. 6, '06..	District Surveyor and Town Engineer.
Henderson, W.	Chilliwack, B.C.	Nov. 17, '83..	
Holcroft, H. S.	Toronto, Ont.	Feb. 18, '03..	District Surveyor and Town Engineer.
Hopkins, M. W.	Edmonton, Alta	" 20, '01..	
Hubbell, E. W.	Ottawa, Ont.	May 19, '84..	District Surveyor and Town Engineer.
Irwin, J. M.	Kenora, Ont.	April 14, '72..	
James, S.	Toronto, Ont.	" 14, '72..	District Surveyor and Town Engineer.
Jephson, R. J.	Winnipeg, Man.	May 12, '80..	
Johnson, A. W.	Kamloops, B.C.	Mar. 12, '02..	District Surveyor and Town Engineer.
King, W. F.	Ottawa, Ont.	Nov. 21, '76..	
Kirk, J. A.	Revelstoke, B.C.	May 11, '80..	District Surveyor and Town Engineer.
Klotz, O. J.	Ottawa, Ont.	Nov. 19, '77..	
Knight, R. H.	Edmonton, Alta.	Feb. 18, '04..	District Surveyor and Town Engineer.
Latimer, F. H.	Detroit, Mich.	" 13, '85..	
Laurie, R. C.	Battleford, Sask.	April 27, '83..	District Surveyor and Town Engineer.
Lawe, H.	Ottawa, Ont.	" 14, '72..	
Lemoine, C. E.	Quebec, Que.	Mar. 31, '82..	District Surveyor and Town Engineer.
Lendrum, R. W.	Strathcona, Alta.	May 15, '80..	
Lonergan, G. J.	Buckingham, Que.	Feb. 28, '01..	District Surveyor and Town Engineer.
Lumsden, H. D.	Ottawa, Ont.	April 14, '72..	
Macpherson, C. W.	Dawson, Yukon Territory	Mar. 7, '00..	District Surveyor and Town Engineer.
Magrath, C. A.	Lethbridge, Alta.	Nov. 16, '81..	
Malcolm, L.	Blenheim, Ont.	April 14, '72..	District Surveyor and Town Engineer.
Meadows, W. W.	Maple Creek, Sask.	Feb. 23, '05..	
Miles, C. F.	Toronto, Ont.	April 14, '72..	District Surveyor and Town Engineer.
Moberly, H. K.	Innisfail, Alta.	Feb. 27, '03..	
Molloy, J.	Winnipeg, Man.	April 14, '72..	District Surveyor and Town Engineer.
Montgomery, R. H.	Prince Albert, Sask.	Feb. 23, '05..	
Moore, H. H.	Calgary, Alta.	" 17, '04..	District Surveyor and Town Engineer.
McArthur, J. J.	Ottawa, Ont.	" 17, '79..	

SESSIONAL PAPER No. 25b

APPENDIX No. 3.—List of Dominion Land Surveyors who have been supplied with Standard Measures.—*Continued.*

Name.	Address.	Date of Appointment.	Remarks.
McColl, G. B.	Winnipeg, Man.	Mar. 20, '07	
McFadden, M.	Neepawa, Man.	Feb. 14, '72	
McFarlane, W. G.	Toronto, Ont.	May 19, '05	
McFee, A.	Innisfail, Alta.	Feb. 19, '79	
McGrandle, H.	Wetaskiwin, Alta.	May 30, '83	
McKenna, J. J.	Dublin, Ont.	April 14, '72	
McKenzie, J.	New Westminster, B.C.	Nov. 18, '88	Dominion Lands Agent, New Westminster.
McLatchie, J.	Nelson, B.C.	April 14, '72	
McLean, J. K.	Ottawa, Ont.	" 1, '82	Dept. of Indian Affairs.
MacLennan, A. L.	Toronto, Ont.	Feb. 23, '05	
McMillan, G.	Ottawa, Ont.	" 22, '06	Inspector of Surveys, Dept. of Interior.
McPherson, A. J.	Dawson, Yukon Ter.	" 21, '01	
McPhillips, G.	Windsor, Ont.	June 17, '75	
McVittie, A. W.	Blairmore, Alta.	Mar. 30, '82	
Nash, T. S.	Ottawa, Ont.	Feb. 18, '04	Topographical Surveys Branch, Dept. of Interior.
Ogilvie, W.	"	April 14, '72	
O'Hara, W. F.	"	Feb. 19, '95	
Ord, L. R.	Winnipeg, Man.	April 1, '82	
Parsons, J. L. R.	"	Feb. 23, '05	
Patrick, A. P.	Calgary, Alta.	Nov. 19, '77	Dominion Topographical Surveyor.
Pearce, W.	"	May 10, '80	
Phillips, E. H.	Ottawa, Ont.	Feb. 24, '02	Topographical Surveys Branch, Dept. of Int.; Sec.-Treas. D.L.S. Association.
Ponton, A. W.	Macleod, Alta.	May 18, '81	
Proudfoot, H. B.	Saskatoon, Sask.	Mar. 28, '82	
Rainboth, E. J.	Ottawa, Ont.	May 19, '81	
Rainboth, G. C.	Aylmer, Que.	April 14, '72	Boundary Surveys, Dept. of Int.
Reid, J. L.	Ottawa, Ont.	" 14, '72	Dept. of Indian Affairs.
Reilly, W. R.	Regina, Sask.	Nov. 17, '81	
Richard, J. F.	Ste. Anne de la Pocatière, Que.	May 13, '82	
Rinfret, R.	Montreal, Que.	Feb. 20, '00	
Ritchie, J. F.	Nelson, B.C.	Jan. 7, '89	
Robertson, H. H.	Montmagny, Que.	April 14, '72	
Roberts, S. A.	Victoria, B.C.	May 16, '85	
Roberts, V. M.	Sturgeon Falls, Ont.	" 17, '86	
Robinson, F. J.	Regina, Sask.	Feb. 22, '00	Dept. of Public Works for Saskatchewan.
Rombough, M. B.	Morden, Man.	April 14, '72	
Rorke, L. V.	Toronto, Ont.	Aug. 13, '91	
Ross, G.	Welland, Ont.	Nov. 21, '82	
Ross, J. E.	Kamloops, B.C.	Feb. 12, '01	
Roy, G. P.	Quebec, Que.	Nov. 17, '81	
Saint Cyr, J. B.	Ste. Anne de la Pérade, Que.	Feb. 17, '87	
Saint Cyr, A.	Ottawa, Ont.	" 17, '87	
Saunders, B. J.	Edmonton, Alta.	Nov. 16, '84	
Seager, E.	Kenora, Ont.	April 14, '72	
Selby, H. W.	Toronto, Ont.	Nov. 15, '82	
Sewell, H. de Q.	"	May 16, '85	
Shaw, C. A. E.	Victoria, B.C.	" 10, '80	
Smith, C. C.	West Selkirk, Man.	Feb. 22, '06	
Speight, Thos.	Toronto, Ont.	Nov. 16, '82	
Starkey, S. M.	Starkey's P.O., N.S.	April 14, '72	
Stewart, G. A.	Calgary, Alta.	" 14, '72	
Stewart, L. B.	Toronto, Ont.	Nov. 22, '82	Dominion Topographical Surveyor; Professor of Surveying, School of Practical Science.
Stewart, E.	Ottawa, Ont.	April 14, '72	
Talbot, A. C.	Calgary, Alta.	May 13, '80	
Teasdale, C. M.	Concord, Ont.	Mar. 9, '06	
Thompson, W. T.	Fort Qu'Appelle, Sask.	Nov. 19, '77	Dominion Topographical Surveyor.
Tracy, T. H.	Vancouver, B.C.	April 14, '72	City Engineer, Vancouver.
Tremblay, A. J.	Les Eboulements, Que.	Feb. 18, '96	
Towle, C. F.	Magog, Que.	April 14, '72	
Turnbull, T.	Winnipeg, Man.	Mar. 29, '82	

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APPENDIX No. 3.—List of Dominion Land Surveyors who have been supplied with Standard Measures.—*Concluded.*

Name.	Address.	Date of Appointment.	Remarks.
Tyrrell, J. W.....	Hamilton, Ont.....	Feb. 16, '87..	Dept. of Public Works for Saskatchewan.
Vaughan, J. W.....	Vancouver, B.C.....	June 11, '78..	
Vicars, J.. .. .	Kamloops, B.C.....	May 17, '86..	
Walker, E. W.....	Regina, Sask.....	Mar. 27, '07..	
Wallace, J. N.....	Calgary, Alta.....	Feb. 20, '00..	Topographer of the Dept. of Int. Dominion Topographical Surveyor.
Warren, J.	Walkerton, Ont.....	April 14, '72..	
Watt, G. H.....	Ottawa, Ont... ..	Feb. 24, '02..	
Weekes, A. S.....	Clinton, Ont... ..	" 11, '92..	
Weekes, M. B.....	Ottawa, Ont.....	" 18, '03..	
Wheeler, A. O... ..	Calgary, Alta.. ..	Nov. 21, '82..	
White-Fraser, G. W.R.	Ottawa, Ont... ..	Feb. 21, '88..	
Wiggins, T. H.....	Regina, Sask.....	" 18, '96..	
Wilkins, F. W.....	Norwood, Ont.....	May 18, '81..	
Wilkinson, W. D.....	Toronto, Ont.....	Feb. 22, '93..	
Woods, J. E.... ..	Frank, Alta.....	Nov. 14, '85..	Dominion Topographical Surveyor.
Young, W. B.....	Winnipeg, Man.....	Mar. 25, '05..	

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APPENDIX No. 4.

LIST of lots in the Yukon Territory surveys of which have been confirmed from July 1st, 1906, to March 31st, 1907.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
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GROUP No. 1.

35	160.00	C. S. W. Barwell...	1906	Nov. 24, 1906..	Messrs. Simer, McRae, Boggs & Carlsen
36	80.00	"	1906	" 24, 1906..	" " " "
37	159.00	"	1906	" 24, 1906..	" " " "
38	20.00	"	1906	" 24, 1906..	" " " "
39	20.00	"	1906	" 24, 1906..	" " " "

GROUP No. 2.

265	15.80	T. D. Green.....	1906	Nov. 12, 1906..	The Klondike Mines R. R. Co.
279	28.01	"	1906	July 5, 1906..	Dawson City Quartz Mining Co. Ltd.
280	45.80	"	1906	" 9, 1906..	" " " " "
296	51.52	"	1906	Oct. 19, 1906..	Peter Anderson.
297	51.65	"	1906	" 19, 1906..	" "
343	47.33	"	1906	" 30, 1906..	Mrs. M. J. Mitchell.
344	57.65	"	1906	" 30, 1906..	"
365	51.65	"	1905-06	" 19, 1906..	Mrs. L. D. Schmidt.

APPENDIX No. 5.

LIST of miscellaneous surveys in the Yukon Territory returns of which have been received during the nine months ending March 31st, 1907.

Year.	Surveyor.	Description of Survey.
1906	H. G. Dickson	Reference traverse from the B. C. Boundary at Windy Arm to Carcross, at Caribou Crossing.

APPENDIX No. 6.

STATEMENT of work executed in the office of the chief draughtsman.

Returns of surveys examined:—

Township subdivision..	354
Township outline..	122
Mineral claims..	17
Correction and other miscellaneous surveys..	256
Township plans completed for printing..	451
Preliminary township plans prepared..	179
Proofs of plans examined..	541
Sketches made..	946
Tracings and miscellaneous plans made..	718
Applications for various information dealt with..	1,026
Instructions to surveyors..	86
Files received and returned..	940
Progress sketches received and filed..	630
Field books received from surveyors..	365
Plans received from surveyors..	169
Plans of Yukon lots received..	13
Plans of miscellaneous Yukon surveys received..	1
Sectional maps revised but not reprinted..	5

Sectional maps revised and reprinted:—

3 miles to 1 inch..	22
6 miles to 1 inch..	24

Sectional maps printed:—

3 miles to 1 inch..	2
6 miles to 1 inch..	3
Sectional maps reprinted 3 miles to 1 inch..	6
Declarations of settlers received and filed..	382
Reference traverses drawn on group plans of Yukon Territory.	1
Mineral claims reduced to 40 chains to an inch and plotted on group plans of Yukon Territory..	2
Books sent to record office to be placed on record..	649
Plans, other than township plans, sent to record office to be placed on record..	81
Books received from record office and used in connection with office work..	3,446
Books returned to record office..	3,586
Volumes of plans received from record office and used in con- nection with office work..	38
Volumes of plans returned to record office..	54
Plans received from record office and used in connection with office work..	372
Plans returned to record office..	303

APPENDIX No. 7.

LIST of sectional maps revised, printed, reprinted, and revised and reprinted from
July 1, 1906, to March 31, 1907.

1. Sectional maps revised but not reprinted:—

Port Moody.	Rosebud.
Cypress.	Duck Mountain.
Fairford.	

2. Sectional maps compiled and printed.

(a) On a scale of 6 miles to 1 inch:—

Lake of the Woods.

(b) On scales of 3 miles and 6 miles to 1 inch:—

Cross Lake.	Mossy Portage.
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3. Sectional maps reprinted on a scale of 3 miles to 1 inch:—

Macleod.	Rocky Mountain House.
Blackfoot.	Humboldt.
Rush Lake.	Pasquia.

4. Sectional maps revised and reprinted.

(a) On a scale of 3 miles to 1 inch:—

Wood Mountain.	Portage la Prairie.
Willow Bunch.	Red Deer Forks.
Souris.	Regina.
Dufferin.	Qu'Appelle.
Swift Current.	Riding Mountain.
Moosejaw.	Manitoba House.
Moose Mountain.	Fort Alexander.
Brandon.	Sounding Creek.
Bad Hills.	Fort Pitt.
Yorkton.	Shell River.
Carlton.	Prince Albert North.

(b) On a scale of 6 miles to 1 inch:—

Wood Mountain.	Winnipeg.
Souris.	Spillimacheen.
Turtle Mountain.	Blackfoot.
Dufferin.	Red Deer Forks.
Emerson.	Rush Lake.
Macleod.	Regina.
Moose Mountain.	Qu'Appelle.
Portage la Prairie.	Riding Mountain.
Manitoba House.	Yorkton.
Fort Alexander.	Rocky Mountain House.
Sounding Creek.	Humboldt.
Bad Hills.	Pasquia.

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APPENDIX No. 8.

STATEMENT of work performed in the survey records office for the nine months ending
March 31, 1907.

Files received and dealt with.. . . .	5,307
Letters drafted.. . . .	3,118
Reports, drafts, memos to council.. . . .	.....
Plans, tracings, &c., copied or compiled.. . . .	315
Statutory declarations, copied and mailed.. . . .	356
Plans sent to agents, registrars, &c.. . . .	19,911
Pages of field notes copied.. . . .	875
Prints of plans received and stored.. . . .	87,112
Original plans received and recorded.. . . .	657
Original field notes received and recorded.. . . .	540
Letters written to agents.. . . .	958
Registered parcels mailed.. . . .	1,281

Work done for Topographical Surveys and other branches.

Books searched for.. . . .	5,028
Books sent.. . . .	3,394
Books returned.. . . .	3,920
Plans searched for.. . . .	1,789
Plans sent.. . . .	1,421
Plans returned.. . . .	514
Volumes searched for.. . . .	86
Volumes sent.. . . .	55
Volumes returned.. . . .	45

APPENDIX No. 9.

STATEMENT of work executed in the photographic office during the nine months ending
March 31, 1907.
FOR THE DEPARTMENT OF THE INTERIOR.

	4 x 5.	5 x 7.	8 x 10.	10 x 12.	11 x 14.	16 x 18.	18 x 20.	24 x 30.	30 x 36.	36 x 42.	42 x 48.	Total.
Dry plate negatives	328	204	6									538
Bromide prints...	375	317	127		571	12	91	131	14	12		1,650
Vandyke prints....			49	3	79	5	27	27	8	3	13	214
Silver prints	906	692										1,598
Photo-lithographs..					6		648					654
Wet plate negatives			66		82	616	94					858
Total	1,609	1,213	248	3	738	633	860	158	22	15	13	5,512

FOR THE GEOLOGICAL SURVEY.

	4 x 5.	5 x 7.	8 x 10.	10 x 12.	11 x 14.	16 x 18.	18 x 20.	24 x 30.	30 x 36.	36 x 42.	42 x 48.	Total.
Dry plate negatives	30	135										165
Bromide prints..			4		232	6						242
Silver prints	19	249										268
Wet plate negatives					1	1						2
Total	49	384	4		233	7						677

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APPENDIX No. 10.

STATEMENT of work executed in the lithographic office during the nine months ending
March 31, 1907.

Month.	Maps.		Townships.		Forms.	
	No.	Copies.	No.	Copies.	No.	Copies.
1906.						
July	5	2,150	60	6,000	1	140
August	4	1,200	35	3,500	9	5,925
September	5	2,300	55	5,500	6	925
October	19	6,250	73	7,300	5	1,280
November	6	1,950	63	6,300	6	4,580
December	5	1,950	59	5,900	9	5,760
1907.						
January	7	3,800	105	10,500	5	2,026
February	9	6,300	55	5,500	7	824
March	3	662	35	3,500	8	3,950
Totals	64	26,562	540	54,000	56	25,410

SUMMARY OF WORK FOR THE NINE MONTHS.

	Number of Jobs.	Number of Copies.	Number of Impressions.	Cost.	Cost per map or form.
				\$ cts.	\$ cts.
Maps	64	26,562	45,686	1,319 40	20 61
Townships	540	54,000	54,500	3,715 20	6 88
Forms, &c.	56	25,460	28,670	631 40	11 27
Totals	660	106,022	128,856	5,666 00	

APPENDIX No. 11.

Names and duties of employees of the Topographical Surveys Branch at Ottawa.
(Metcalf street, corner of Slater street).

Deville, E., D.T.S., LL.D., Surveyor General.

CORRESPONDENCE AND ACCOUNTS.

Brady, M., secretary.

Hunter, R. H., accountant.

Wilkinson, Percy, assistant accountant.

Percival, M. F., stenographer and typewriter.

Cullen, M. J., stenographer and typewriter.

Pegg, A., messenger.

O'Leary, James J., messenger.

OFFICE OF THE CHIEF DRAUGHTSMAN.

Symes, P. B., chief draughtsman.

Shanks, T., B.A.Sc., D.L.S., assistant to chief draughtsman.

First Division—Instructions and General Information.

Brown, T. E., B.A., in charge of division.

Stacey, A. G., B.A., D.L.S., O.L.S.

Sylvain, J.

Green, W. T., B.A., D.L.S.

Durnford, F. G. D.

Weekes, M. B., B.A.Sc., O.L.S., D.L.S.

Mudie, J. M., Grad. R.M.C.

Carroll, M. J., Grad. S.P.S.

Cumming, A. L., B.Sc.

Seymour, H. L., Grad. S.P.S., D.L.S., O.L.S.

Umbach, J. E., Grad. S.P.S., D.L.S.

Dodge, G. B.

Burkholder, E. L.

Fitzgerald, C. C.

Kimpe, M.

Second Division—Examination of Surveyors' Returns.

Phillips, E. H., Grad. S.P.S., D.L.S., in charge of division.

Nash, T. S., Grad. S.P.S., D.L.S.

Empey, J., B.A.Sc., D.L.S., O.L.S.

Henderson, F. D., Grad. S.P.S., D.L.S.

Barber, H. G., Grad. S.P.S.

Burgess, E. L., Grad. S.P.S., O.L.S., D.L.S.

Hill, S. N., Grad. S.P.S.

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Dennis, E. M., B.Sc.
Elder, A. J., Grad. S.P.S.
Morrier, J. E.
Chilver, H. L., Grad. S.P.S.
McClennan, W. D.
Cram, A. S.
Owens, R. B., B.A., B.E.
Davies, T. A., D.L.S.
Elwell, W., Grad. S.P.S.
Roger, A.
Clunn, T. H. G.
Robertson, D. F., Grad. S.P.S.
Goodall, J. N., Grad. S.P.S.
Heathcott, R. V.
Rochon, J. W.
Macdonald, J. A.
Spreckley, R. O.
Marriott, F. L.
Brice, E. E.
Smith, C. C., B.A., D.L.S., O.L.S.

Third Division—Drawing Plans for Printing.

Engler, Carl, B.A., D.L.S., in charge of division.
O'Connell, J. R.
May, J. E.
Archambault, E.
Helmer, J. D.
Moule, W. J.
Bergin, W.
Hutton, J. B.
Moran, J. F.
Villeneuve, E. J.
Brown, A.
Tremblay, A.
Ball, J. C.
Shore, S. H.
Williams, E. R.

Fourth Division—British Columbia Surveys.

Rowan-Legg, E. L., in charge of division.
Gillmore, E. T. B., Grad. R.M.C.
Lawe, H., D.L.S.
Morley, R. W.
MacIlquham, W. L., B.Sc.
Weld, W. E.
Wilson, E. E. D.
Carson, P. A., B.A., D.L.S.

Fifth Division, 185 Sparks street—Mapping.

Smith, Jacob, in charge of division.
Bégin, P. A.
Lepage, J. B.

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Blanchet, A. E.
 Grey, G. A.
 Davies, T. E. S.
 Belleau, J. A., D.L.S.
 Taggart, C. H.
 Perrin, V.
 Smith, H. J.
 Genest, P. F. X.

OFFICE OF THE GEOGRAPHER.

(Woods building, Slater street).

White, J., geographer.
 Baine, H. E.
 Chalifour, J. E.
 Dumouchel, G. E.
 Taché, H.
 Darrach, M.
 Wilson, H. W.
 Akerlindh, A.
 Anderson, W.
 Blatchley, H. M.
 Bennie, J.
 Wood, C. G.
 Craig, R. W.
 Chandler, S.
 Groulx, A.
 Gagnon, J. S.
 Inkster, F. B.
 Blue, W.

SURVEY RECORDS OFFICE.

(Canadian building, Slater street).

Steers, C. J., clerk in charge.
 Currie, P. W., B.A., B.Sc., D.L.S., assistant clerk in charge.
 Surtees, W. S., draughtsman.
 Sowter, T. W. E., draughtsman.
 Smith, F. W., draughtsman.
 Routh, C. F., draughtsman.
 Ashton, A. W., draughtsman.
 Lecourt, Eugène, draughtsman.
 Moore, R. T., draughtsman.
 Lambart, O. H., draughtsman and typewriter.
 Belleau, Eugène, draughtsman.
 Yielding, Miss A., typewriter.
 Landry, Narcisse, messenger.

LITHOGRAPHIC OFFICE.

(Metcalf street, corner of Slater street).

Moody, A., foreman.
 Thicke, H., power press printer.
 Bergin, J., transferrer.

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Boyle, S., stone polisher.
Gagnon, J., press feeder.
Thicke, C., engraver and lithographer.

PHOTOGRAPHIC OFFICE.

(Metcalf street, corner of Slater street).

Topley, H. N., photographer in charge.
Carruthers, H. K., photo-lithographer and photo-engraver.
Woodruff, J., photographer.
Whitcomb, H. E., photographer.
Morgan, W. E., photographer.
Kilmartin, A., photographer.
Devlin, A., photographer.
Ouimet, Geo., photographer.

GEOGRAPHIC BOARD.

(Woods building, Slater street).

Whitcher, A. H., D.L.S., secretary.

APPENDIX No. 12.

EXAMINATION PAPERS OF THE BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

EXAMINATION FOR ADMISSION AS ARTICLED PUPIL—LIMITED PRELIMINARY.

XVII.

February 12th, 1907.

FIRST PAPER.

	Marks.
1. Penmanship and Orthography.	50
2. The eagle weighs 258 grains, nine-tenths pure gold ; 1869 sovereigns weigh 480 ounces Troy, eleven-twelfths pure gold. Find the value of one sovereign in terms of the dollar.	6
3. A man invests \$600 in 5 per cent stocks at 120 ; at the end of the year, having just received the yearly dividend, he sells at 121½. How much better off is he than if he had loaned his money at 5 per cent per annum ?	6
4. A certain number between 10 and 100 is eight times the sum of its digits, and if 45 be subtracted from it the digits will be reversed : find the number.	6
5. The sum of the reciprocals of two consecutive numbers is $\frac{1}{3}\frac{5}{8}$: find them.	7
6. Prove geometrically $a^2=b^2+c^2-2bc\cos A$.	7
7. Draw a straight line in a given direction so that chords cut from it by two given circles may be equal.	7
8. Find value of $(\frac{2}{3})^{\frac{1}{2}}+(\frac{3}{8})^{\frac{1}{2}}+(\frac{5}{7})^{\frac{1}{2}}+(\frac{7}{5})^{-\frac{1}{2}}$.	7
9. Find the values of x which satisfy the following equations: $5x = \frac{1}{5}$, $10x = 23$, $13x = 117$, $3^{2x+1} = 5^{3x-1}$.	7
10. Solve the equation $85-3x = 124-2x$. having given $\log 2=.30103$, $\log 3=.47712$	7

SECOND PAPER.

	Marks.
11. Deduce the formula for the area of a triangle in terms of the three sides.	8
12. A hemisphere, a cylinder and a cone stand on the same base. If their heights are the same, compare their volumes and their areas.	9
13. Two simultaneous observations for altitude were made in the same vertical plane on a meteor at two places 3 miles apart; the respective elevations were 42° and 58° . What was the height of the meteor ?	9
14. Deduce $\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$ and $\tan^2 \frac{1}{2} A = \frac{(s-b)(s-c)}{s(s-a)}$.	9
15. Given $a=13$; $b=15$; $C=107^\circ 30'$, find c .	9
16. Deduce $\tan^2 \frac{1}{2} a = \frac{-\cos S \cos (S-A)}{\cos (S-B) \cos (S-C)}$	9
17. Given $b=99^\circ 41'$; $c=100^\circ 50'$; $A=65^\circ 33'$; find a .	9
18. Given $a=120^\circ$; $b=70^\circ$; $A=130^\circ$; find C and B .	9
19. Given $a=100^\circ$; $b=50^\circ$; $c=60^\circ$; find A .	9

SESSIONAL PAPER No. 25b

EXAMINATION FOR ADMISSION AS ARTICLED PUPIL—FULL PRELIMINARY.

XXIX.

February 12th to 15th, 1907.

PENMANSHIP AND ORTHOGRAPHY (PRELIMINARY AND FINAL).

Their was formally more suspishun among men than we find to-day. Sumtimes reppresentashuns were made, folowed by coershun of each inderviduall.—

— Aggericultur is grately prommoated by the guvverment, so is forrestery. On the farm we see wheat, barly, oats, puttatos, terneps, carats, unnions, beens, marry-golds, sage, time, and menny other prodducks, wich when fotergraffed tugether or sepperate make a verry prittie picshur, pervided one has a good cammera.—

— In fissiks the barommeter, thermommitter, and higerommeter are important insteraments or apperattus. Our ordernary sences are not verry accute, for, small chainges in heat are not perseptabel by them.—

— A plaice directly oppersite to ours is called antipperdease, and it would be resonible to assume that the climate their would be akseptibble to us, not too riggerous nor too troppikle. Bannaners grow well in a moist, humite atmusfere, such as one finds on the vulcannic islands in the paciffic oshun, but termattos grow better whare the air and climit are more modderit and temperrit. The appel does not devellop at all in the troppicks.—

— The eliptissity of the earth is allways eggsaggurated in a diergram, the aktual ratio of the diammaters would not make the impresshun of an oblaite sferide.—

— Emmegrants are daly leeving Europe and immeigrants are weakly arriveing in Montreal, and travule westwards to the furtle basons of the Bow and Sascatchwan rivvers, where they find good land, good watter, good skules, and good nayburs.

ARITHMETIC AND LOGARITHMS.

Marks.

(Time, 3 hours.)

1. The discount on a note made February 27, 1906, at 3 months for \$1080 with interest at 5 per cent and discounted March 18 following was \$13.12. Find the rate of discount. 12
2. A sum of money at compound interest doubled itself in 18 years. Find the rate of interest. 12
3. How much gold 90 per cent pure must be mixed with 24 ounces 65 per cent pure so that the alloy may be 80 per cent pure? 12
4. A vessel has three taps A, B and C. By A it is emptied in 5 hours, by B in 7 hours, while C takes two-thirds as long as A and B together. In what time can the vessel be emptied by three taps together? 12
5. The logarithm of the product of two consecutive numbers is 2.4857214. Find the numbers. 13
6. Find value of $(\frac{1}{2})^{\frac{1}{2}} - (\frac{1}{3})^{\frac{1}{2}} + (\frac{2}{3})^{\frac{1}{2}} - (\frac{1}{4})^{\frac{1}{2}}$ 13
7. Find angle, the logarithm of its sine being 9.6234562.
 “ “ tangent being 0.2345678n.
 “ “ secant being 0.3148923n. 13
8. Find logarithmic value for sin 92° 13’
 “ “ cos 104° 15’
 “ “ tan 85° 17’ 13

ALGEBRA.

(Time, 3 hours.)

	Marks.
1. Find the L. C. M. of $x^2-10x+24$; $x^2-8x+12$, and x^2-6x+8 ; and the H. C. F. of $6x^2-13x+6$; $2x^2+5x-12$, and $6x^2-x-12$.	12
2. Two-thirds of A 's money is equal to B 's; and three-fourths of B 's is equal to C 's; together they have \$650. How much has each?	12
3. Solve $\frac{3x-1}{2} - \frac{y}{4} = \frac{7}{2}$; $x+3y=9$.	12
4. Find a fraction which becomes $\frac{1}{2}$ on subtracting 1 from the numerator and adding 2 to the denominator, and reduces to $\frac{1}{3}$ on subtracting 7 from the numerator and 2 from the denominator.	12
5. Solve $\frac{21x^3-16}{3x^2-4} - 7x=5$.	13
6. Solve $x^2y^2-6x=34-3y$; $3xy+y=2(9+x)$.	13
7. Expand $(x+y)^5$ and $(x+y+z)^3$.	13
8. A person selling a horse for \$72, finds that his loss per cent is one-eighth of the number of dollars that he paid for the horse. What was the cost price?	13

PLANE GEOMETRY.

FIRST PAPER.

(Time, 3 hours.)

	Marks.
1. When in a triangle $a^2+b^2=c^2$ prove that C is a right angle.	12
2. The straight lines which bisect the angles of a triangle meet in a point.	12
3. Find the side of a square equal to a given rectangle.	12
4. Construct a rectangle equal to a given square such that the difference of two adjacent sides shall be equal to a given straight line.	12
5. Similar arcs of circles which have equal chords, are equal.	13
6. Inscribe a circle in a given triangle.	13
7. Describe a circle to touch a given circle and two given tangents to the circle.	13
8. Prove that the locus of a point whose distance from one of two fixed points is double that from the other, is a circle.	13

PLANE GEOMETRY.

SECOND PAPER.

(Time, 3 hours.)

	Marks.
9. Prove geometrically $(a-b)^2+4ab=(a+b)^2$.	12
10. The locus of the middle points of all chords drawn through a fixed point in a circle, is a circle.	12
11. Describe a circle about a given triangle.	12
12. Show how to cut off the corners of an equilateral triangle so as to leave a regular hexagon.	12

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13. If an angle of a triangle be bisected by a straight line which cuts the opposite side, the rectangle contained by the segments of that side is less than the rectangle contained by the other sides by the square on the line. 13
14. Similar triangles are to one another in the ratio duplicate of the ratio of two corresponding sides. 13
15. Bisect a given triangle by a line parallel to its base. 13
16. If an angle of a triangle be bisected internally or externally by a straight line which cuts the opposite side or that side produced, the ratio of the segments of that side is equal to the ratio of the other sides of the triangle. 13

PLANE TRIGONOMETRY.

Marks.

(Time, 3 hours.)

1. Prove that $\sin (A - B) = \sin A \cos B - \sin B \cos A$. 12
2. Prove that $\tan (A - 45^\circ) = \frac{\tan A - 1}{1 + \tan A}$ 12
3. Prove that $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$. 12
4. Show that $\sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$. 12
5. Given $a = 31.24$, $b = 49.00$, $A = 32^\circ 18'$, find c . 13
6. Given $a = 6.24$, $b = 2.35$, $C = 110^\circ 32'$, find A . 13
7. Given $A = 50^\circ 39'$; $B = 60^\circ 07'$; $a = 412.67$, find c . 13
8. Given $a = 13$; $b = 12$, $c = 5$, find C . 13

SPHERICAL TRIGONOMETRY.

(Time, 3 hours.)

Marks.

1. Prove $\cos a = \cos b \cos c + \sin b \sin c \cos A$. 14
2. Deduce $\cos^2 \frac{1}{2} A = \frac{\sin s \sin (s-a)}{\sin b \sin c}$ 14
3. State and prove Napier's rules for the solution of right-angled spherical triangles. 14
4. given $c = 140^\circ$, $a = 20^\circ$ $C = 90^\circ$, solve the triangle. 14
5. Given $b = 99^\circ 41'$, $c = 100^\circ 50'$, $A = 65^\circ 33'$, find a . 14
6. Given $A = 135^\circ 05'$, $C = 50^\circ 30'$; $b = 69^\circ 35'$, find B . 15
7. Given $A = 120^\circ$, $B = 130^\circ$; $C = 80^\circ$ find c . 15

MENSURATION OF SUPERFICIES.

(Time, 3 hours.)

Marks.

1. The sides of a field are 7.84 ch., 9.32 ch. and 10.56 ch., find its area. 14
2. What parallels of latitude would divide the surface of the earth into three equal areas? 14
3. If the surface of a sphere is changed to that of a tetrahedron, what is the edge of the latter? 14

SESSIONAL PAPER No. 25b

- | | |
|--|----|
| 4. The sum of the squares on the sides of a parallelogram is equal to the sum of the squares on the diagonals. | 15 |
| 5. Find the side of a square equal to a given rectangle. | 15 |
| 6. The largest rectangle, the sum of whose sides is given, is a square. | 15 |
| 7. Angles in the same arc of a circle are equal. | 15 |
| 8. The locus of a point at which a given straight line subtends a constant angle is an arc of a circle. | 15 |
| 9. To inscribe a regular polygon of fifteen sides in a circle. | 15 |
| 10. Prove that the bisectors of all the angles of any regular polygon meet in a point. | 15 |

SOLID GEOMETRY.

(Time, 3 hours.)

- | | Marks. |
|--|--------|
| 1. Only one straight line can be drawn through a given point at right angles to a given plane. | 8 |
| 2. Two intersecting planes cannot both be at right angles to the same straight line. | 8 |
| 3. The sum of any two plane angles of trihedral angle is greater than the third angle. | 8 |
| 4. The sum of the plane angles of any convex polyhedral angle is less than four right angles. | 8 |
| 5. Describe a sphere about a given tetrahedron (not regular). | 8 |
| 6. What are the linear dimensions of a sphere, cube, and equilateral tetrahedron having the same volume? | 8 |
| 7. What are the dimensions when the solids in the above question have the same surface? | 9 |
| 8. The axes of an oblate spheroid are 12 and 20. What is its volume? | 9 |
| 9. What is the volume of a prismoid, the length and breadth of its greater end being 24 and 16 inches, those of its top 16 and 12 inches, and its length 120 inches? | 9 |

SPHERICAL TRIGONOMETRY.

(Time, 3 hours.)

- | | Marks. |
|---|--------|
| 1. Show that $\cos a \sin b = \sin a \cos b \cos C + \sin c \cos A$. | 15 |
| 2. Deduce $\sin \frac{1}{2} a = \sqrt{\frac{-\cos S \cos (S-A)}{\sin B \sin C}}$. | 15 |
| 3. Deduce $\tan \frac{1}{2} (a-b) = \frac{\sin \frac{1}{2} (A-B)}{\sin \frac{1}{2} (A+B)} \tan \frac{1}{2} c$. | 15 |
| 4. Find the area of a spherical triangle | 15 |
| 5. Given $A=100^\circ$, $a=112^\circ$, $C=90^\circ$, solve the triangle. | 15 |
| 6. Given $b=98^\circ 02'$, $c=80^\circ 36'$, $A=10^\circ 16'$, find a | 20 |
| 7. Given $a=40^\circ 16'$, $b=47^\circ 44'$, $A=52^\circ 30'$, find B . | 15 |
| 8. Given $a=100^\circ$, $b=50^\circ$, $c=60^\circ$, find A . | 15 |

MEASUREMENT OF AREAS (FIRST PAPER).

(Time, 3 hours.)

	Marks.
1. To cut off from a quadrilateral any given portion by a line drawn from one of its angles.	16
2. To divide a triangle into two given parts by a straight line passing through a given point within the triangle.	16
3. In the triangle ABC , $AB = 14\text{ch}$, $BC = 13\text{ch}$, $CA = 15\text{ch}$. It is required to bisect it by a straight line running from BC to AB and making an angle of 60° with BC . What is the length of the dividing line?	16
4. If the northern hemisphere were covered with an ice-cap five miles thick, from the north pole to latitude 40° , when melted what depth of water would this give when spread over the whole earth, radius 4,000 miles, density of ice $\cdot 9$?	17
5. The half-mile line of a half-mile race track is composed of two equal tangents and of two equal circular arcs, the radius is 200 feet. What is the area enclosed by the half-mile line?	18
6. How many acres are included between the parallels of 49° and 50° and between the meridians 100° and 101° ?	17

MEASUREMENT OF AREAS. (SECOND PAPER.)

(Time, 3 hours.)

7. The notes of a survey of a piece of land are as follows :—

	CH	
1. N. $34^\circ 15'$ E.	2.73	
2. N. 85 00 E.	1.28	
3. S. 56 45 E.	2.20	
4. S. 34 15 W.	3.53	
5. N. 56 30 W.	3.20	40

Required, the area after first balancing the survey.

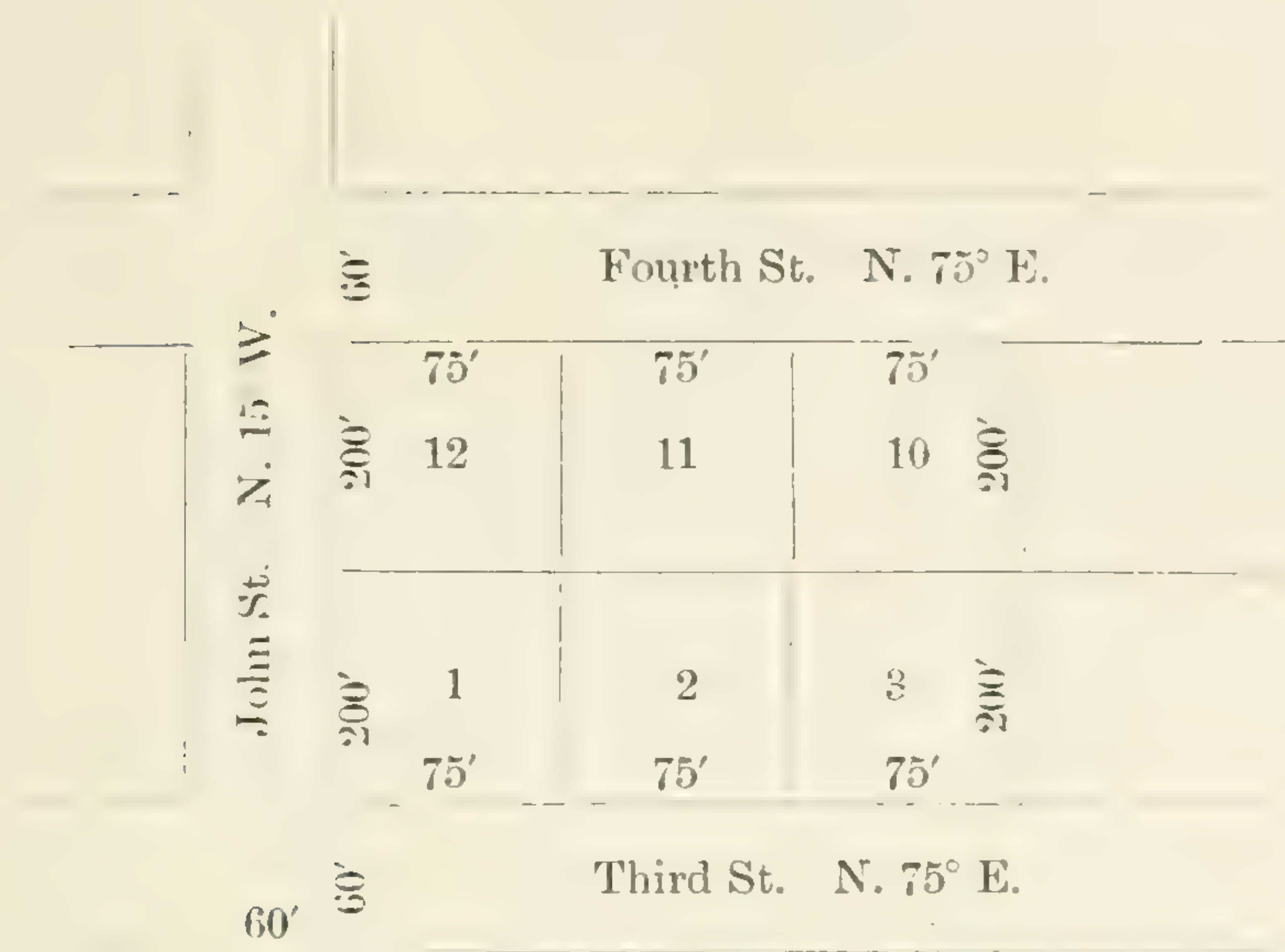
8. (a) Express the conditions necessary for a closed survey by two equations.
- (b) Show what missing data may be supplied and whether any ambiguity may arise.
- (c) How does the supplying of missing data affect balancing the survey? 20
9. Deduce the method of computing areas by 'latitude and departure.' 20
10. If in question 7 the azimuth of every course is in error $30'$, and a re-survey of the area were made with the proper azimuths beginning at the fixed point 1, what displacement in latitude and departure would station 3 suffer? 20

DESCRIPTIONS.

(Time, 3 hours.)

Marks.

1.



The above is part of the registered plan of the town of Holly, in the county of Tweed and province of Alberta. A sells to B a part of Lot No. 1, and adjoining John and Third streets. The part sold is to have a frontage of forty feet on Third street, to extend to the rear of the lot, and the dividing line to be parallel to John street. Make a description for a deed.

25

2. Using the plan of question 1. Supposing A to own lots Nos. 1 and 2, he sells Lot No. 2 to B and gives the right of ingress and egress to B by a lane, 16 feet wide, running along the whole of the rear limit of Lot No. 1. Make the necessary description for the conveyance.

25

3. Moose Creek flows across the N.E. $\frac{1}{4}$ Sec. 12, Tp. 13, R. 15 W., in an easterly direction. B desires to buy the northerly part of the quarter section lying north of the creek together with the creek. From measurement the southerly bank of the creek intersects the eastern and western quarter section lines respectively at 22.12ch and 20.18ch from the northern quarter section line. The whole area to be conveyed is supposed to contain 85 acres. Make a description for a deed.

25

4. Make a description for the remaining part of the quarter section given in question 3.

25

ASTRONOMY. (FIRST PAPER.)

(Time, 3 hours.)

Marks.

- (a) Define sidereal, mean, solar, and standard time.
(b) When from an observed altitude of the sun at a given place we deduce the hour angle in degrees and then convert this into time, what kind of time is it? Why?
(c) When similarly from an altitude of a star we compute the hour angle, what kind of time is it? Why?
- Explain fully the equation of time, and show how and why it varies during the year, and that it vanishes four times a year.
- What are the least and greatest values that the azimuth of Polaris at greatest elongation can have, and what are the respective latitudes?

13

13

13

4. What is the standard time of greatest elongation (eastern) of Polaris in February 15, 1904, in latitude $45^{\circ} 25' N.$ longitude $75^{\circ} 43' W.$? 13
5. What is the sidereal time of rising of Arcturus ($a=14^h 11^m 29^s$, $\delta=+19^{\circ} 40'$) on same date and place as in above question? 12
6. On same date as above the observed altitude of Arcturus on the prime vertical was $72^{\circ} 13'$. What was the latitude of the place? 12
7. On same date as above the observed meridian altitude of Arcturus measured from the north horizon was $70^{\circ} 20'$. What was the latitude of the place? 12
8. On July 2, 1904, in longitude $110^{\circ} W.$, the meridian altitude of the upper limb of the sun at lower or northern culmination was $9^{\circ} 47'$. What was the latitude of the place? 12

ASTRONOMY. (SECOND PAPER.)

Marks.

(Time, 3 hours.)

9. On June 21, 1904, at the township corner T. IV, V, R. V, VI, W. of 2nd M. at watch-time $8^h 15^m 30^s$ the observed altitude of the sun was $32^{\circ} 16'$. What was the azimuth and watch correction? 17
10. In the above question what was the right ascension of a star which crossed the meridian at the time of observation of the sun? 17
11. At the place in question 9, a pocket sidereal chronometer is fast on local sidereal time $8^m 17.3^s$, and has a daily losing rate of 4.5^s . Ten days later on the same base line the chronometer was found to be fast $10^m 32.5^s$. What was the exact position with reference to section corner, of the latter place of observation? 17
12. The difference of meridian zenith distance between Arcturus and Polaris at lower transit was $35^{\circ} 09'$. What was the latitude of the place, $\delta'=88^{\circ} 49'$, $\delta=9^{\circ} 40'$? 17
- Is there any ambiguity?
13. What is the standard time of sun-rise at date and place in question 9? 16
14. What was the local mean time on June 21, 1904, when the shadow of a picket at Sec. 3-4, Tp. IV-V, R. V-VI, W. of 2nd M. fell on the base line? 16

MANUAL OF SURVEY. (FIRST PAPER.)

Marks.

(Time, 3 hours.)

1. Define an initial meridian, a base line, and a correction line. Where are the initial meridians? How is the deficiency or surplus in surveyed lines disposed of? 20
2. Describe the different kinds of posts, mounds, pits and trenches used in the present system of survey. Show how and where they are placed. 20
3. How would you mark the following posts:
 - (a.) At the corner between Sections 13, 14, 23 and 24, Tp. 57, R. 21, east of the P.M.
 - (b.) At the south corner between Sections 31 and 32, Tp. 50, R. 7, W. of the 3rd M.
 - (c.) At the N. E. corner of Section 17, Tp. 42 A., R. 1, W. of 3rd M. (on the south side of the road allowance dividing two systems of survey.)
 - (d.) At the south corner of Tp. 51 between ranges 18 and 19, W. of 4th M.
 - (e.) At the witness mound placed at a distance of 6 chains west of the N. W. corner of Section 25, Tp. 15, R. 22, W. of the 3rd M. 20

SESSIONAL PAPER No. 25b

4. How is a settlement surveyed? Give the rules to be observed in measuring a distance by means of a triangle.

20
5. Define a bearing and an azimuth. To what meridian is a bearing referred in subdividing a township and how is it deduced from an observed azimuth?

20

MANUAL OF SURVEY. (SECOND PAPER.)

(Time, 3 hours.)

Marks.

6. How are the north and the south boundaries of a township surveyed?
When is a quarter section considered sufficiently surveyed for disposal?
What are the limits of error allowed in a subdivision survey?

20
7. What is to be entered in the report made by a surveyor on the subdivision of a township? What is the date of a survey?

20
8. What are the bodies of water in a township which have to be surveyed, and what are those which are not to be surveyed?
In what manner is a traverse made?
Give the rules governing the rights of riparian owners.

20
9. Define, a resurvey, a retracement survey, a restoration survey, an obliterated monument and a lost monument. Give the rules governing the above surveys. Under what circumstances is a subdivider justified in resurveying or retracing a township outline?

20
10. All the section and quarter section corners around section 34, Tp. 58, and section 3, township 59, range 13, W. of 2nd M. are lost, but the positions of the adjoining corners are known. How would you proceed to re-establish the lost corners?

20

EXAMINATION FOR CERTIFICATE AS DOMINION TOPOGRAPHICAL SURVEYOR—SUPPLEMENTAL.

X

FEBRUARY 12TH TO 15TH, 1907.

ALGEBRA.

(Time, 3 hours.)

Marks.

1. Find the number of (1) three digits, (2) of four digits in the denary scale such that if the first and last digits be interchanged the result represents the same number in the nonary scale, and prove that there is only one solution in each case.

8
2. The whole number next greater than $(3+\sqrt{5})^n$ is divisible by 2^n .

7
3. If on an average one vessel in every ten is wrecked, find the chance that out of 5 vessels expected, 4 at least will arrive safely

7
4. The number of ways in which p things may be distributed among q persons so that everybody may have one at least is
$$q^p - q(q-1)^p + \frac{q(q-1)}{2}(q-2)^p \dots\dots\dots$$

7
5. Show that if a, b, c, d , be four positive unequal quantities and $s = a + b + c + d$ then $(s-a)(s-b)(s-c)(s-d) > 81abcd$.

7

6. Solve the equation
$$\sqrt{x+27} + \sqrt[4]{55-x} = 4.$$

7
7. In a shooting competition a man can score 5, 4, 3, 2, or 0 points for each shot: find the number of different ways in which he can score 30 in 7 shots.

7

PLANE TRIGONOMETRY.

- (Time, 3 hours.)

Marks.
1. If $\phi = \frac{\pi}{13}$ show that
$$\cos \phi + \cos 3\phi + \cos 9\phi = \frac{1 + \sqrt{13}}{4}$$

and $\cos 5\phi + \cos 7\phi + \cos 11\phi = \frac{1 - \sqrt{13}}{4}$

9
2. Having given the equation
$$\frac{\cos a}{\cos \theta} + \frac{\sin a}{\sin \theta} = -1$$

prove that

$$\frac{\cos^3 \theta}{\cos a} + \frac{\sin^3 \theta}{\sin a} = 1.$$

8
3. If $\sin A, \sin B, \sin C$, be in harmonical progression so also will be
 $1 - \cos A, 1 - \cos B, 1 - \cos C.$

8
4. Sum the following infinite series, and the corresponding series in sines :
 $\cos \theta + \frac{1}{2} \cos 2 \theta + \frac{1}{3} \cos 3 \theta + \dots\dots\dots$

8
5. Demonstrate Euler's formulæ:
$$\cos x = \frac{1}{2} (e^{x\sqrt{-1}} + e^{-x\sqrt{-1}})$$
$$\sin x = \frac{1}{2\sqrt{-1}} (e^{x\sqrt{-1}} - e^{-x\sqrt{-1}})$$

8
6. Develop the sine and cosine of the multiple angle in a series of ascending powers of the cosine of the simple angle.

9

ANALYTICAL GEOMETRY.

- (Time, 3 hours.)

Marks.
1. An ellipse and a parabola have a common focus, and the other focus of the ellipse moves on the directrix of the parabola. Show that the points of contact of a common tangent subtend a right angle at the common focus.

10
2. (a) Find the equation of the evolute of the common parabola.
(b) Show that a (produced) normal to an involute is tangent to the evolute, the point of tangency is the centre of curvature and consequently the normal thus produced is the radius of curvature.

10

SESSIONAL PAPER No. 25b

3. (a) Determine the asymptotes of the locus $x^3 - xy^2 + ay^2 = 0$ by developing $y = f(x)$
 (b) Produce the formulae for passing from a polar to a rectangular system of co-ordinates. 10
4. (a) Produce the polar equation of a conic section.
 (b) What is the polar equation of an ellipse whose axes are 12 and 8, the pole being at the focus? What are the focal distances? 10
5. Two tangents TP, TQ to an ellipse meet any other tangent $P^1 Q^1$, prove that $PP^1 \cdot QQ^1 = TP^1 \cdot TQ^1 \cos^2 \frac{\alpha - \beta}{2}$; where α and β are the eccentric angles at P, Q. 13
6. The equation of the straight lines which pass through the origin and make an angle α with the straight line $x + y = 0$ is $x^2 + 2xy \sec 2\alpha + y^2 = 0$. 12
7. (a) The eccentric angles of the vertices of conjugate diameters differ by 90° .
 (b) Any chord which passes through the focus of an ellipse is a third proportional to the transverse axis and a diameter parallel to the chord. 10

THEORY OF LIMITS AND DIFFERENTIAL CALCULUS.

Marks.

(Time, 3 hours.)

1. Define 'limit.' - 3
2. Prove geometrically that the area of a circle is equal to that of the regular circumscribed or inscribed polygon, in the limit when the number of sides of the polygon is indefinitely increased. 10
3. In a triangle ABC , a point D is taken in AB , and a point E in AC produced, CE being m times BD . Find the point of ultimate intersection of BC and DE , when BD and CE are indefinitely diminished retaining always the same ratio to one another. 10
4. Find the volume of the portion of a paraboloid of revolution included between the vertex and a plane perpendicular to the axis and at a given distance from the vertex. (A geometrical solution will be preferred). 10
5. Differentiate
 $\tan^{-1} \frac{a'}{a}$; $(\cos x)^{\cos x}$; $\cos^{-1} e^{ax} - e^{-ax}$. 9
6. Expand in ascending terms of x to five terms
 $x e^{-a^2 x^2} \cos r x$. 9
7. Given two sides a and b of a spherical triangle find the variation in the side c and the angles A and B due to a small variation of the angle C . 10
8. With the data of the last question express A in a series in terms of a , b and C when the angle B is very nearly a right angle. 14

GEODETIC SURVEYING.

	Marks.
(Time, 3 hours.)	
1. Deduce the formula for reducing a base line to sea-level.	20
2. Deduce the formula for the effect of a deflection of the plumb-line upon an observed azimuth.	20
3. Given the pull, length and weight of a tape, deduce the formula of the correction for sag.	20
4. Describe a modern base line apparatus for primary triangulation and its use.	20
5. How would you run between two points of the same observed latitude a line having the curvature of the parallel of said latitude. Deduce the formula.	25
6. Find the difference of altitude of two stations from their reciprocal zenith distances, assuming the refraction to be equal for both.	25
7. Deduce a formula for the ellipticity of the earth from the length of the seconds pendulum at two places.	25
8. Having observed the angles between three known points from a fourth point deduce a formula for the distance of the fourth point from each of the others.	25
9. Given the latitude of a place find the radius of curvature along a given azimuth.	20

ASTRONOMY. (FIRST PAPER.)

	Marks.
(Time, 3 hours.)	
1. From the following ephemeris of the moon:	
Mar. 3, 12 ^h R.A. 20 ^h 28 ^m 17 ^s .88	
4, 0 20 58 57.08	
4, 12 21 29 02.01	
5, 0 21 58 28.39	
5, 12 22 27 15.43	
6, 0 22 55 25.50	
6, 12 23 23 03.39	
find the difference of the moon's right ascension in one minute for March 5, 0 ^h .	17
2. To find the parallax of a star in zenith distance and azimuth when the apparent zenith distance and azimuth are given, the earth being regarded as a spheroid.	17
3. In the method of observing for time by an observation of Polaris and of a time star in the same vertical, as given in the Manual of Dominion Lands, show the derivation of the formula of p (the arc of a great circle from the pole perpendicular to the above vertical)= $P \sin (t-t')$ $+\frac{P^2}{2} \sin 2 (t-t') \tan \delta + \dots$	17
4. If a, a' are the hour angles in degrees of the sun at Greenwich at t and t' hours mean time, deduce the equations of time at the preceding and following mean noons, expressed in fractions of an hour.	17
5. Find the R.A. of the sun at true noon on October 8, 1906, given that the equation of time for that day is—12 ^m 13 ^s , and that the sidereal time of mean noon on March 21 was 23 ^h 52 ^m 22 ^s .	16
6. On February 19, 1906, in latitude 45° 25' N., longitude 75° 42' W., what is the standard time when α and β Orionis are in the same vertical plane? $\delta \alpha = 7^\circ 23' \text{ N. } a \alpha = 5^h 50^m$ $\delta \beta = 8^\circ 19' \text{ S. } a \beta = 5^h 10^m$	16

SESSIONAL PAPER No. 25b

ASTRONOMY. (SECOND PAPER.)

(Time, 3 hours.)

7. In Talcott's method for latitude deduce the formula for reduction to the meridian:

(1) When the line of collimation of the telescope is off the meridian, the instrument having been revolved in azimuth and the star observed at the hour angle T near the middle thread, then

$$M = \frac{2 \sin^2 \frac{1}{2} T}{\sin 1''} \cdot \frac{\cos \phi \cos \delta}{\sin \xi}$$

- (2) When the star is observed off the line of collimation, the instrument remaining in the plane of the meridian, then

$$M = \frac{2 \sin^2 \frac{1}{2} T}{\sin 1''} \cdot \frac{1}{2} \sin 2\delta \quad 16$$

8. (a) In determining equatorial intervals of threads by stars within 10° of the pole, deduce the formula

$$(i_n = (t_n - t) \cos \delta \sqrt[3]{\cos T_n})$$

where T_n is the hour angle of the star for the respective threads.

- (b) Give formulae for level constant including inequality of pivots when angle of the V of the level is not the same as of V of the transit. 16

9. As a ship starts from Liverpool its chronometer indicates 0^h and is correct by Greenwich mean time. After 16 days, as it reaches Quebec the chronometer indicates $7^h 00^m 23^s$, and Quebec time is $2^h 05^m 42^s$. Nearly 7 days afterwards the ship departs at Quebec noon, the chronometer then reading $4^h 54^m 39^s$; and when it reaches Liverpool after a voyage just over 14 days it is found to be 17^s slow by Greenwich mean time. What is the longitude of Quebec? 17

10. Deduce the general formula (Mayer's) for the transit instrument in the meridian

$$T = a \frac{\sin (\phi - \delta)}{\cos \delta} + b \frac{\cos (\phi - \delta)}{\cos \delta} + \frac{c}{\cos \delta}$$

11. Deduce the formula for finding the latitude from the observed transits (a number of threads) over the prime vertical, east and west of the meridian, when the instrument is reversed at each transit between the observations of the star on opposite sides of the prime vertical (Struve's method). 17

12. (a) At sidereal time t the zenith distance of a given star is ζ and at time t^1 the zenith distance is ζ^1 . Find the latitude and express it in terms of the data.

- (b) On March 24 at noon the sun's declination was $1^\circ 29' 05''.1$ and the difference of right ascension of the sun and a star $6^h 01^m 54^s.45$. On September 18 following at noon the sun's declination was $1^\circ 49' 30''.2$, and it was distant from the star $5^h 27^m 32^s.97$ in right ascension. On September 19 at noon the sun's declination was $1^\circ 26' 12''.8$, and it was distant from the star $5^h 31^m 08^s.3$ in right ascension. Find the right ascension of the star and that of the sun at the first observation. 17

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THEORY AND USE OF INSTRUMENTS.

(Time, 3 hours.)

	Marks.
1. Describe a modern form of level instrument for geodetic levelling.	20
2. Explain the different methods in use for the determination of the collimation of an astronomical transit.	15
3. Describe Ramsden's and Huyghen's eye-pieces. How are the diaphragm threads illuminated for nadir observations with a mercurial horizon?	15
4. How would you investigate the figure of the pivots of an astronomical transit?	20
5. Describe the Kew Dip Circle and its use for the determination of inclination and intensity.	20
6. Explain why temperature affects the rate of a watch and how its effect is corrected. If you wish to make your chronometer run faster or slower without altering its temperature compensation, which of the balance screws will you turn?	15
7. How do you explain the large errors in heights measured with an aneroid as compared with measurements by the mercurial barometer?	15
8. Define isobars and their connection with the direction of the wind in the northern hemisphere. Define relative humidity and dew-point.	15
9. Convert Fahrenheit's degrees to Centigrade and Reaumur.	15

REPORTS OF SURVEYORS

GENERAL REPORTS OF SURVEYORS

1906-1907

APPENDIX No. 13.

REPORT OF C. F. AYLSWORTH, JR., D.L.S.

SURVEYS AND RESURVEYS IN EASTERN MANITOBA.

MADOC, March 13, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour, in accordance with my instructions dated April 17, 1906, to submit the following general report on my survey operations during the season of 1906.

I left home on Monday, April 23, after having returned from Kingston, where I interviewed several young gentlemen of Queen's University with whom you instructed me to consult previous to their joining my party.

I arrived in Winnipeg on April 29, and immediately proceeded to organize a party and purchase my supplies. The labour question is the burning one of the west, as men are not at all obtainable in proportion to the demand. It is therefore very difficult to organize a satisfactory party; and I was occupied in this for several days. But after getting the party organized and having the outfit delivered at Beausejour, we all left Winnipeg for that place on Friday, May 4. We arrived there at noon, got the outfit unloaded and tents up and began the surveyor's usual life. We were engaged for a few days in putting the outfit in order. Beausejour is an old friend of mine, having been engaged in surveys there during the year 1900 for ten months. I found the town has progressed most remarkably since that time; there were general stores in abundance; a chartered bank, churches, hotels, lawyers, doctors, real estate agents and one of the most attractive schools in the province of Manitoba (constructed of cement blocks) and also all the necessary tradesmen the surrounding country and town requires.

While I was there a company was organized to construct, equip and operate a glass factory. The peculiar quality of the sand in the district is especially adapted to the manufacture of glass. This, of course, will be a very great boon to Beausejour if the experiment proves successful. The factory is built right on top of the sand required to manufacture the glass and the sand is there in unlimited quantities. This gives the company an immense advantage. I remember about thirty years ago a factory was built and operated for a time in the town of Napanee, Ontario, but the disadvantage there was that the owners were compelled to transport the suitable sand for glass making purposes from Brockville, Ontario, and on account of sundry other handicaps they could not manufacture glass in Napanee within twenty per cent of the price of the glass imported into and sold in Canada. The gentlemen comprising the Beausejour glass enterprise are all Germans, who come from the country where glass is successfully manufactured and where glass-blowers are trained to perfection. The company seems to be erecting a good class of buildings and have such confidence in

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the future success of their venture that they are making a large outlay of capital. Another industry that has been started there and whose output of goods cannot cope with the demand is a cement block equipment. These blocks when utilized in the construction of buildings are permanent, and present an especially attractive appearance. Then again, they are manufacturing a very superior quality of steam-dried white brick.

The development of the agricultural resources of the Beausejour district is as yet in its initial stage. North, south, east and west of the town, the farmers, generally speaking, are Galicians, Poles, Bohemians, Russian-Germans and Germans of a very industrious type. In fact the district through which I was operating last season is very thickly settled. In many cases the quarter sections are divided into legal subdivisions of forty acres each, and each legal subdivision is occupied. These people have not as yet begun the production of wheat for the market, confining themselves merely to the clearing and fencing of their farms and building for themselves comfortable houses. As a result there has been no demand as yet for elevators in Beausejour. The main travelled road leading north from that town between ranges 7 and 8 is so closely settled that it resembles a trip through the suburbs of a city. Their dwellings present a neat and attractive appearance, the windows being decorated with curtains and flowers. The people take a deep interest in the education of the rising generation; their schools are numerous and well patronized. They also look diligently after their religious and spiritual welfare by providing attractive, commodious and substantial places of worship. From Beausejour northerly for a distance of twelve miles, there are no less than three churches, located as follows:—One on section 7, township 14, range 8; one on section 18, township 14, range 8, and another on section 6, township 15, range 8. In addition to the services held in these attractive edifices, services are conducted in the different schoolhouses throughout the district. These numbered four or five, so that there was no reason why the members of my party should not have good and proper religious disciplining.

In townships 13, 14 and 15, ranges 7 and 8, in the neighbourhood of one hundred and fifty thousand dollars has been expended within the last two years for drainage purposes and the cost assessed against the adjoining lands. The material from the ditches has been thrown up and formed into a road-bed and nearly all the roads have thus been assisted, and rendered in a manner passable, except in those portions of the townships lying east of Brokenhead river. In this portion not nearly so many miles of drainage have been constructed as on the west side of the river and the eastern district is of such a swampy nature that the roads there are not passable except in a very few places. At any rate ditches east of that river have been constructed only along the east and west road allowances although all the north and south road allowances have been cleared of timber and scrub.

The people generally are not all satisfied with the manner in which this ditching has been executed. They feel that the cost has been excessive and that the work has not been efficiently done. In a great many cases the water must flow up grade in order to reach the outlet, viz.: Brokenhead river. One of these instances, I might be permitted to mention, is along the north boundary of sections 35 and 36, in township 13, range 7. Then again in a great many cases the material has been thrown up to form a roadbed without leaving any berm. As a result the material easily slides back into the ditch and makes travelling with vehicles dangerous. While the ground is frozen one might as well try to ride longitudinally along a large water soaked saw-log for the experience of sliding and shuing would be about the same, and unless these defects are remedied many actions will arise against the municipality for damages.

I would not have mentioned this feature of the conditions in Brokenhead district only that the statement of these facts assists in explaining a great difficulty I met with during the progress of my survey. In your instructions to me the third clause read: 'The petitions have already been forwarded to be circulated in the townships and to be signed by all owners or homesteaders.' Well, when I arrived there I found that not a single name had been attached to these petitions; that even the

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councillor representing the constituency in which the work was to be done would not sign or circulate it. He was the councillor who introduced the resolution into the Brokenhead council requesting the government to have the corners re-marked. Then when I arrived I found the people who had signed the petition asking to have the drainage plan carried out, so enraged that they refused to sign another petition of any description. Then a few of these who were opposed to the survey on other grounds, industriously circulated the report that the people had been deceived by being told that they would not have to pay anything for the drainage and that they would be deceived the same way in this matter and would eventually have to pay for this survey. I mention this as a sample of the opposition with which I had to contend. They also said I was going to upset the old corners and shift the roads and thereby cause them to lose their improvements. But when I saw how groundless all this opposition was it made me all the more determined to set matters right, especially when I saw that a great many people seriously wanted to have their corners made according to the manner of instructions. It occupied a great deal of time and required a great deal of patience to induce many of the people to sign the petitions. Another class whom I could not approach at all were those who owned large farms, who knew they had larger farms than their neighbours and were afraid they would possibly be deprived of a portion of their holdings.

I think I have gone into this feature of my report sufficiently deep to give you an idea of the difficulties I had to contend with. Also on account of very few of the people being able to speak English, my progress was rendered all the more difficult. Then again the people said they had been taken advantage of in signing papers for other propositions—so that taking everything into consideration when a man comes around with a paper asking them to sign it they generally refuse to have anything to do with it. One man after a rather heated argument said ‘Well, I will sign this, but if I am deceived through it, I will never sign another paper even for the preacher.’ But all this opposition did not deter me in the least from plodding away, and now I fancy that if a surveyor were to return there to complete the work I was instructed to do that every man of them would sign without having to be asked. In fact, a little previous to my departure from that district I heard that such was the case.

I found that the original lines, more especially in township 14, range 8, had been surveyed in an exceptionally irregular manner. And when such is the case and roads are constructed and fences erected and the people do not gather the necessary evidence, I found it impossible in some cases to establish the corners. There is very serious confusion as to where the original corners were, especially at the northeast corners of sections 12, 24, 25 and 36 in township 14, range 7; also at the northeast corner of section 19, township 14, range 8. There are other minor cases of quarter section corners that were not established, because the interested parties would not sign the petition, but they will ultimately be settled in all probability. In the case of sections 12, 24 and 25 and section 19, the location of the exact site of the original corner is a question of evidence. The interested settlers did not show any desire to gather the necessary evidence to locate those corners, the people, who could establish the corner under oath, having moved away. I did not observe any provision in your instructions authorizing me to pay witness and transportation fees of these people to give such evidence. However, the people interested told me that evidence to establish the corners could be procured, so I followed your instructions and left these corners for them to settle amongst themselves. Then again, at the northeast corner of section 36, township 14, range 7, the original corner was lost, but the settlers all signed the agreement to abide by my corner. But after I had planted a hub at the true corner (and where many old settlers said the old post stood) some of those who had signed the petition objected. I may add that the original lines here are very seriously in error. Some of the settlers who had signed the petition consulted Winnipeg lawyers as to the legality of my position for this corner. I therefore considered

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it preferable not to take advantage of their having signed the petition being ignorant at the time as to where I would locate the corner, and I decided not to establish the corner. Months afterwards when I was too far away to return and establish the corner where I planted the hub, those who had objected in the first instance, requested me to return, as they were now satisfied, but it was impossible for me to return and do so.

Permit me to frankly inform you that when I first began the survey between ranges 7 and 8 across township 14 that I was much discouraged as to whether I could make a success of it, for the following reasons. Two years ago they had engineers surveying the ditches that I have already described; these ditches were to run along the road allowances north and south, and east and west, but they do not appear to have adopted any systematic plans of laying out the ditches, along this town line especially. The west side of the ditch in a great many instances coincided with the survey line for the west boundaries of the road allowance, and one was not sure that, when the engineers found the original post, they took pains to replace it where they found it. (I do not mean deliberately.) Neither was I satisfied that the workmen during the construction of the ditches did not unwittingly disturb the post. Perhaps my fears were groundless, and I do not even suggest that anyone wilfully moved a post, but here were all these factors that contributed in no small degree to my uneasiness. Every corner I did establish is perfectly satisfactory to all parties, and I renewed nearly all excepting the ones I have already mentioned, but where there was the slightest possibility of a future misunderstanding I left them, as you have instructed, to be settled through the courts. I did not in any case ride rough shod over the objections of any man so that I trust that if I have erred, that I have erred on the safe side by not doing anything that would compromise your department in the event of legal complications. Excepting with the cases I have mentioned I have had very little difficulty with the balance of the survey barring the signatures to the petitions, all of which I am herewith submitting to you.

Between August 18 and September 7, I resurveyed township 10, range 7, east of the principal meridian. Petitions had already been circulated in the township for signature, and all signed them excepting one settler, who for some reason would not consent to add his name when it was being circulated. However, after I had completed the survey, he was so well satisfied that he volunteered to sign, but as I did not anticipate any trouble, I did not deem it necessary to have his name added to the list which had already been forwarded to you.

The new Grand Trunk Pacific railway passes through this township and runs nearly parallel to the north boundary. They are making an exceptionally serviceable and permanent roadbed. I am told that the grades are easy and that there is only one curve between Winnipeg and where it crosses the main line of the Canadian Pacific railway in the neighbourhood of Rennie station. The curve I have mentioned is caused by a desire to cross the Dugald dump on the third correction line as abruptly as possible in order not to unnecessarily interfere with traffic along the highway. Owing to the fact that the railway was so parallel to the highway when they were crossing they would necessarily follow it so far that the public became alarmed, and the council of the municipality requested this curve. The soil in this township is of a limestone gravelly nature, but still the few real farmers who are in the township produce a surprisingly large quantity of grain.

Please observe that I have not in my notes discriminated in detail between the scrub, bush and cultivated lands. My reason for this departure is that the people were clearing the land so rapidly that where it is bush, scrub and prairie to-day it is cultivated and growing crops to-morrow. In conclusion I desire to take this opportunity to thank all the members of my survey party for their loyalty and support to me during the past season; as is generally the case with me I did not have a particle of trouble.

I have the honour to be, sir,

Your obedient servant,

C. F. AYLSWORTH, JR., D.L.S.

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APPENDIX No. 14.

REPORT OF DAVID BEATTY, D.L.S.

RETRACEMENT SURVEYS IN SASKATCHEWAN.

PARRY SOUND, March 28, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on my survey operations for the season of 1906, under your instructions bearing date April 20, 1906.

I left Parry Sound on May 19, for Battleford, where I had stored my camp outfit in the fall of 1905. I stayed a day in Winnipeg to buy tents, &c., as some of my old outfit was not in good condition. I went from Winnipeg to Battleford via the Canadian Northern railway. After reaching Battleford I was delayed four days hunting for horses which would be suitable for the work and at reasonable prices. On the fourth day I bought four horses and brought in two of my own which I had wintered at a ranch south of Battleford, and started four men with the outfit across country to Prince Albert. I afterwards bought two horses at Thompson's ranch in September. I went by train to Prince Albert, where I hired other men to make up my party. My outfit arrived at Prince Albert on June 4, and after resting my horses for a day I moved up to Sturgeon lake on the 6th, and commenced work by first running the boundary line between ranges 27 and 28, township 51, west of the second meridian. I destroyed the old monuments that had been built one chain east of the Indian reserve line. I then made a survey of that part of Sand lake which is in township 51, range 27 and resurveyed such portion of said township as I thought necessary. No settlers have come into the township since 1903, although a considerable portion of it will make fairly good farming land when cleared of the poplar timber. I found the country very difficult to survey, on account of high water in the numerous swamps and sloughs, and after receiving your permission to go into work north of Radisson and return to the Prince Albert work in the fall, I moved my outfit into township 45, range 9, west of the third meridian, arriving there July 9. I made a resurvey of about two-thirds of the lines in the township and continued my resurvey work through townships 45, 44, 43, 42, 41, range 10 and townships 44, 43, 42 and 41, range 11. In some of the townships I resurveyed all the lines. When I had finished the resurvey of township 42, range 10, I moved over to Redberry lake on September 9, and surveyed four islands, as directed, before going into township 42, range 11. After completing the resurvey of township 41, range 10 on October 10, I moved my outfit into township 38, range 13, and made a resurvey of the block composed of sections 28 and 33. From there I moved north again to township 49, range 1, west of the third meridian, going by way of Aldina, and made a survey on October 26 of that part of a lake which extends from Mistawasis Indian reserve into sections 30 and 31, township 47, range 6. I reached township 49, range 1, and commenced a resurvey of the same and continued the survey through township 50, range 1, west of the third meridian, and townships 50, ranges 28, 27 and 26, west of the second meridian. I resurveyed such lines only as I thought were necessary. I came into Prince Albert on December 12, settled with my party, stored my outfit and took my horses to their winter quarters and arrived home on December 19.

I have the honour to be, sir,

Your obedient servant,

DAVID BEATTY, D.L.S.

APPENDIX No. 15.

REPORT OF P. R. A. BELANGER, D.L.S.

MISCELLANEOUS SURVEYS IN THE PROVINCES OF MANITOBA, SASKATCHEWAN AND ALBERTA.

OTTAWA, ONT., March 19, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—I have the honour to submit the following report on my different survey operations during last year in the provinces of Alberta, Saskatchewan and Manitoba.

In compliance with your instructions dated January 23, 1906, notifying me that I had been appointed chief commissioner for the investigation of halfbreed land claims at Lac la Biche, in company with Reverend Father H. Grandin and Mr. Wilfrid Gariepy, barrister of Edmonton, I left for Edmonton on February 26, and after meeting the other two commissioners and having made all the necessary arrangements for transport and board, we left Edmonton together on March 7 for Lac la Biche, and reached that place on the 11th.

The next day the commission began its work, and held sittings for a whole week, hearing and investigating all claims that were made and which cover mostly all the lots in the settlement.

No conflicting claims were presented, and I am glad to say that all claimants appeared to be satisfied with our decision, and proved their satisfaction by an address they presented us, expressing their gratitude for our dealings in the matter.

A full report on all the claims investigated was forwarded on March 27 to the secretary of the department, giving our ruling in each case, and recommending the action which in our judgment should be taken to give satisfaction to the claimants. Not having seen the settlement since I surveyed it in 1889, I expected to find great improvements, but I regret to say that I was much disappointed; the farming which was carried on in those days to a certain extent has been abandoned. The land which was then cultivated is now overgrown with scrub, and the inhabitants seem to care only for fishing, trapping and freighting to make their living. The land, however, is first class, and the climate would permit of raising all kinds of cereals and vegetables, but as long as it remains in the possession of the present settlers it is bound to remain uncultivated.

On my return to Edmonton I received instructions from the secretary of the department notifying the commissioners to proceed to Lake St. Ann and make a similar investigation into claims preferred by the settlers of that place; but after conferring together on this subject, it was decided to postpone the investigation until the roads should improve. In the meantime Rev. Father Grandin agreed to notify the settlers that the commissioners would be at Lake St. Ann by the end of May to investigate their claims.

Having nothing to occupy me during this interval, I returned to Ottawa and subsequently returned to Edmonton where I arrived at the beginning of May to continue the investigation. Owing to the delay occasioned by the resignation of one of the commissioners, the legal adviser, and before another one had been regularly appointed, it was the 2nd June before we could proceed to Lake St. Ann.

During this interval of delay at Edmonton, I supervised the organization of survey parties by supplying the surveyors with horses, vehicles and other articles of transport, belonging to the department and found suitable for another season's service. I also made arrangements for the disposal of the balance of all survey outfits for which there was no further use.

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On the 2nd June, the commission of inquiry being once more fully organized, we proceeded to Lake St. Ann where we remained till the 8th, hearing and investigating all claims submitted to us, and on the 13th of the same month I submitted the full report of the commissioners to the secretary of the department.

During this investigation we had to deal with conflicting claims for lot 20 of the settlement, but as I had made the survey of that lot in 1889, and having in my hands the original notes of that survey, I was in a position to help the commissioners to adjust the claim and detect the rightful claimant notwithstanding the contradictory evidence given by one of the interested parties.

The remainder of June was taken up in finally disposing of the survey outfits, and investigating into the necessity of making the resurveys applied for in the vicinity of Mewassin, and on which I reported at the time.

On July 1, I left Edmonton for Yorkton where I had instructions to organize a small party and make some verification concerning the discrepancy in description of survey marks as restored in 1902 and 1903 compared with the original description.

After spending a few days at Yorkton for the purchase of my outfit and hiring men, I proceeded to File hills where I began operations. The investigation was carried over many townships in File hills and Touchwood hills, and covered a large tract of country. It was also extended to several townships in the southeastern part of Saskatchewan adjoining Manitoba along the Arcola branch of the Canadian Pacific railway.

Annotated sketches were sent to you during the season showing the verification made for all corners called for by your memorandum and also the rectification applied when necessary. This work occupied me till the middle of September after which according to new instructions, I made the traverse of a few lakes in different townships near the western boundary of Manitoba, and also removed some witness marks which had originally been placed in the road allowances.

On the completion of this work I left Kamsack on October 11 for Touchwood hills and Prince Albert for the purpose of examining survey contracts. On the way I passed through Veregin, Buchanan and another Doukhobor village situated at about two miles west of Buchanan, and I must say here that never before on my different expeditions was I better impressed than by the sight I enjoyed in passing through these villages. All the houses lie in rows at a few feet distant from one another, and are built with great symmetry and appear very neat and clean. This socialistic manner of building villages has certainly an advantage in allowing the inhabitants to visit and assist one another in case of emergency. These Doukhobors are a very moral, quiet and industrious people and notwithstanding their occasional foolish pilgrimages they are undoubtedly desirable settlers. They have already cultivated a large area of their land and their crops rank among the best in the locality.

On October 25, having finished the examination of the part of the survey contract No. 11 of 1906, which was ready for inspection, I proceeded via Wadena and Melfort to Fort à la Corne, where I inspected survey contract No. 18 of 1905, after which I spent the remainder of the season examining contract No. 12 of 1906 north of Prince Albert. Separate reports on the inspection of each of these contracts have already been submitted to you, and I do not see that much can be added to them. The country covered by these three contract surveys is more or less timbered but the timber is of no commercial value; it is good only for fuel, fencing and building purposes, except, however, in Mr. Montgomery's contract north of Prince Albert where railway ties can still be found in paying quantities though thousands of them have already been cut.

A belt of open land is found in contract No. 18 along the south bank of Saskatchewan river in townships 49 and 50, ranges 15, 16 and 17, west of the second meridian. It is very suitable for mixed farming, and at the time of the inspection I was informed that all the part available for homesteading was already taken up, and settlers were coming in to take possession of their new homes.

In contract No. 12 which is due north of Prince Albert there is very little land

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suitable for immediate settlement. The country is mostly all timbered and broken by numerous lakes and swamps. However, some settlers have already forced their way through this forest, and appear satisfied with their lot. Here as well as through the whole of the northern part of Prince Albert and Fort a la Corne districts the odd numbered sections with the exception of the school lands, should all be reserved for homesteads in order to encourage settlers to group themselves into small colonies over the small tracts of land suitable for farming purposes, and until this is done the settlement of this country cannot progress very much.

The lumber trade which is now carried on in a large scale north of Prince Albert is offering a good market to farmers settling in that country for the sale of hay, oats and all other products and provides also employment to thousands of men all the year round.

The completion of the Canadian Northern railway to the town last summer, and the proposal of the company to put a bridge across the river and build a branch line on the north side of the river to Battleford and Edmonton, together with its intention of connecting this town with Hudson Bay, has made the place boom and the price of town lots has risen accordingly to a high figure.

The building of these railway branches should attract the attention of intending settlers to this northern district.

During the course of the season I travelled several hundred miles across the different provinces and everywhere I noticed an activity unparalleled in the annals of the past. In the Edmonton district the country is filling up rapidly; this country is unexcelled for mixed farming, and there is still a large quantity of desirable land ready for settlement. I consider this district the ideal country for farmers from Ontario and Quebec who cannot make up their mind to settle in open country where wood cannot be found for miles around a home.

The File hills and Touchwood hills districts which have for so long been in the wilderness, are now becoming more and more settled every day. The construction of the Grand Trunk Pacific railway which was commenced last summer, brought in numerous settlers who make their new homes along the line.

At a short distance north of Touchwood Hills post office, there is a small settlement named Wishart, established several years ago on the western edge of Round plain. This is a very rich country; all the farmers are well off and carry on mixed farming with great success. Here I saw, at Mr. Michael Hall's, a pioneer of the place, the best fields of wheat that were grown in the west during last summer, but on the other hand, I was greatly disappointed to see the adjoining land, the Round plain, still mostly vacant, when thousands of bushels of fine wheat could be raised. This is due to speculators having acquired this land with scrip, and holding it at a high price. No better country could be desired for farmers who can afford to buy farms offering all advantages as to water and fuel supply in the immediate vicinity, and the prospect of fine crops.

From Round plain to Foam lake, settlers are now seen scattered all along the country where a few years ago there was hardly anybody and at Foam lake there is a very prosperous settlement of Icelanders.

The extension of the Canadian Pacific railway from Sheho towards Saskatoon and Edmonton was under construction last summer and runs at a short distance south of Foam lake, where a small town is already started at the crossing of the creek which empties into the lake; there are already two general stores under construction. The country offers great facilities for mixed farming owing to the large quantities of hay growing in the bed of the lake. This lake has been gradually drying for the past few years, and on that account I would respectfully suggest the resurvey of it and the extension of the subdivision lines therein for the benefit of the settlers who are desirous of taking up this land.

Leaving Foam lake, I passed through townships 32, ranges 9, 10 and 11, which are better adapted for stock-raising than agriculture, though some farms are seen here and there, principally in range 9, where the land is more rolling. The main line of

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the Canadian Northern railway runs through the southern part of township 33, range 9, where a station named Invermay is situated, around which a small village is springing up very rapidly in section 1. The inhabitants speak very highly of the prospects of the country.

From Invermay I journeyed via Theodore through a country fairly well settled and where good crops are seen increasing in quantity and quality as we reach Yorkton the pioneer town of the district.

From Yorkton, I journeyed via Saltcoats, Churchbridge and Wapella, to Wauchope, a station on the Arcola branch of the Canadian Pacific railway, enjoying the finest sight one could witness in the Northwest. The harvest was in full swing everywhere; the country resembled an immense sea of grain and I consider it an ideal paradise for those who prefer a prairie country.

On my way back I passed through Kamsack, following the road which branches off at the Roman Catholic mission on Kee-see-koose reserve towards Bearshead lake, which lake I had to traverse. This road passes through a Galician settlement situated on the western slope of Duck mountain. The country is burnt and overgrown with young poplar, but it is sufficiently open for stock raising. Several small creeks and lakelets are found along the route, where hay is plentiful. At Bearshead lake there is a small Swede settlement raising cattle and doing well, but there is plenty of room left for settlers, who may desire to go into that district.

In conclusion, I may say that all parts of the country which I visited during my trip are very desirable for settlers, according to their tastes; those who prefer prairie districts can find the same in the southern parts, and those who prefer wooded country or bluffs can find it in the northern portion. Game is abundant as in all parts of the Northwest, duck, geese, prairie fowl and deer being plentiful. No minerals were met with in the course of my travels.

On December 22, the snow being very deep, I decided to close my operations, and after making arrangements for wintering my outfit, I left for Ottawa, where I arrived in time for New Year's greetings.

I have the honour to be, sir,

Your obedient servant,

P. R. A. BELANGER, *D.L.S.*

APPENDIX No. 16.

REPORT OF LENNOX T. BRAY, *D.L.S.*

SURVEYS AND RESURVEYS IN SOUTHERN ALBERTA.

AMHERSTBURG, ONT., January 30, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on the various surveys made by me during the past season in the southwestern part of the province of Alberta.

In accordance with your instructions of April 23, I left in a few days following for Virden, Man., from which place I shipped the outfit I was to use during the season, to Macleod, Alberta. Here I met my men and proceeded to township 11, range 22, west of the 4th meridian, to investigate the necessity of a retracement and restoration survey which was reported needed.

After running the lines around this township and restoring all lost corners, I then found that the difficulty was in the east boundaries of sections 6 and 7. The

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monuments at the northeast corner of section 6 and on the east boundary of section 7 being out of place about ten chains, making the east boundary of the northeast quarter of section 6 long, and the east boundary of the northeast quarter of section 7 short by about the same amount.

As most of the quarter-sections governed by these monuments were homesteaded, I endeavoured to have the parties get together and sign a petition that would allow me to rectify these errors, but with no effect. I was therefore unable to make the corrections and reported the matter to you on June 3.

This township is open rolling prairie the soil varying from a sandy loam to a stiff clay.

Parts of sections 17, 18, 19 and 20 are broken by cut banks. Coal crops out along some of these cut-banks on section 18. This coal is used by some of the settlers but is of an inferior quality.

This township is nearly all settled up. On the completion of my work here, I proceeded to township 1, range 30, west of the 4th meridian and continued the survey of the Dominion lands from the northeast corner of section 32 along Oil creek through this township and township 1, range 1, west of the 5th meridian to the lake on the International boundary laying out as many sections and quarter sections adjoining the creek as was possible.

Oil creek valley being only from a quarter to about a half mile wide and bounded on both sides by high steep mountains, is timbered with thick young spruce and jack-pine, though open patches occur all through it.

Through section 30, township 1, range 30 and section 25, township 1, range 1 the valley widens some. The townsite of 'Oil City' is laid out on a part of each of these sections.

The Rocky Mountain Developing company are drilling for oil on section 30. They have one well completed from which they can pump a good quality of crude oil. Two other wells are being put down by them on this section.

The Pincher Creek Oil Company are drilling a well on the north half of section 25, township 1, range 1.

Spruce and pine timber measuring up to forty-eight inches in diameter was found on section 11, township 1, range 1, scattered throughout the central part of the section.

A good wagon road, though in places of a very steep grade, leads from 'Oil City' northeasterly to the prairie.

Oil prospectors who are drilling in Flathead valley are opening up a wagon road out of the valley which will pass through both of these townships and join with the one at 'Oil City.' I next continued the Dominion land surveys from the north boundary of section 7, township 2, range 30, west of the 4th meridian, westerly along Blakiston brook into township 2, range 1, west of the 5th meridian.

On section 13, township 2, range 1, west of the 5th meridian this brook forks, one branch running westerly north of Blakiston mountain and the other running westerly south of Blakiston mountain.

I laid out sections and quarter sections on the north branch as far as the northeast corner of the northwest quarter of section 20, and along the south branch as far as the northeast corner of section 8.

Both branches of Blakiston brook have narrow valleys which are bounded by high bare mountains on both sides.

Open areas occur all through the valleys separated by thick young spruce and jackpine, which also covers the mountain sides.

A block of spruce, pine and balsam timber of about five hundred acres measuring from ten to forty inches in diameter was passed through on the north boundaries of sections 20, 21 and 22. Another block of large timber was observed on the southern part of section 8. A pack trail follows each fork of Blakiston brook through the township. I then retraced and continued the survey of the 5th meridian from the northeast corner of section 24, township 4, range 1, to the northeast corner of township 3,

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range 1, and completed subdividing the remaining portion of township 4, range 30, west of the 4th meridian. This township is rolling land covered with thick willow and young poplar bluffs, with intervening patches of prairie which are about equal in area. It is well watered by springs and brooks running down from the mountains. The soil is a deep black loam, covered with a luxuriant growth of grass.

This township is well adapted for ranching, though considerable land has been broken in it and grain growing started.

Eight squatters' declarations were taken and there appear to be applicants for the remaining quarter sections.

My next work was in township 5, range 2, west of the 5th meridian, where I subdivided the northern two-thirds of the township. This township lies well up in the mountains and is rough and broken by high hills, which are covered with poplar, jack-pine and young spruce, more so on their northern slopes.

There are a number of open flats in the creek valleys, which are nearly all squatted on.

The soil of this township is a thin depth of loam underlaid in most cases by a gravel subsoil.

This township is well watered and adapted for ranching.

A seam of what appears to be good coal, crops out of the cut banks on section 25.

In this township fourteen squatters' declarations were taken.

In townships 6 and 7, range 3, west of the 5th meridian I completed the west outlines and subdivided sections 19, 30, 31 and 32 in township 6, and sections 5, 6, 7 and 8 in township 7. These sections all lie well up in the mountains and are very rough and broken. As a whole they are not at all suitable for any settlement. Though portions of these sections could be used for grazing, they are mostly covered with young pine and spruce.

Coal has been mined on the northeast quarter of section 31; at present, however, the mine is not being operated.

In township 9, range 3, west of the 5th meridian, I laid out sections 1, 2, 11 and 12. Most of the east halves of sections 1 and 12 and the southwest quarter of section 1 lie in a valley which is partly covered with scrub. The soil in this valley is good.

The south half and central northern part of section 2, and central part of section 11, are in a rolling valley which is covered alternately with patches of open prairie and willow and poplar scrub. The remaining parts of these sections are broken by high bare hills.

In township 8, range 3, I completed the survey of the east outline and the subdivision of the two eastern tiers of sections and the east boundaries of sections 4, 9 and 16. The two eastern tiers of sections lie mostly in a wide undulating valley and are covered alternately with patches of prairie and willow and poplar scrub.

These sections are well watered and are suitable for ranching.

Part of the Livingstone range of mountains covers sections 4, 9 and 16 and spurs run out from them a distance of a half mile or more, making the west halves of sections 3, 10 and 15 very rough and broken. The east halves of these sections are suitable for grazing.

Prospectors report having found a good quality of magnetic iron ore on sections 21 and 22.

West of the Livingstone range of mountains I continued the west outline southerly a distance of one mile to the northeast corner of section 12, township 8, range 4. Here owing to the inaccessibility of Goat mountain I ran an offset line southerly through the centres of sections 6 and 7. As the eastern boundaries of section 5, 8 and 17 run nearly along the summit of the Livingstone range of mountains, I was compelled to run an offset line northerly through the centres of sections 5, 8 and 17. These sections are very rough and broken by deep gulches and ravines.

The soil is gravelly and covered with young spruce and poplar scrub in patches.

Coal seems to be plentiful on these sections and is being mined on section 17.

Four squatters' declarations were taken in township 8 and one in township 9.

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In township 7, range 4, west of the 5th meridian, I ran out the north boundaries of section 26 and the south half of section 35 and the east boundary of the west half of section 35, and several other lines in the northeast quarter of section 35, south of the Crow's Nest branch of the Canadian Pacific railway, in connection with the claims of Messrs. Lyon, Pelletier and McKenzie. I then went to township 8, range 6, west of the 5th meridian, and ran the east boundary of section 2. Here after the continued snow storms which rendered work on the mountain sides dangerous and impossible I was compelled to give up the intention of subdividing any further in this locality, and I moved to township 3, range 30, west of the 4th meridian and laid out sections 13, 24, 25 and 36, which are rolling land covered alternately with patches of prairie and willow and poplar scrub, well watered, of excellent soil and suitable for ranching.

Closing up field operations on the completion of this work, I wintered my horses and stored my outfit at Twin Butte and arrived home on December 4th.

I have the honour to be, Sir,

Your obedient servant,

LENNOX T. BRAY, *D.L.S.*

APPENDIX No. 17.

REPORT OF P. A. CARSON, *D.L.S.*

TRIANGULATION SURVEYS IN THE RAILWAY BELT OF BRITISH COLUMBIA.

OTTAWA, January 4, 1907.

E. DEVILLE, Esq., LL.D.,

Surveyor General, Ottawa.

SIR,—I have the honour to submit to you the following report of my field operations on the triangulation in British Columbia in connection with the Trigonometrical Section of the Topographical Survey of Canada, for the season of 1906, with an accompanying map.

I will quote, Sir, from your letter dated the 4th day of July, 1906, 'A surveyor should devote the greatest care to the preparation of his annual report, that being the only thing which parliament and the public have before them to form an opinion of the surveyor's efficiency.' It would seem, therefore, that the object of a surveyor's annual report is not so much to give to the department an exhaustive technical treatise on the surveyor's field operations as to present to the public at large a clear account of the work performed, and to impart such knowledge and information as the surveyor has gleaned while in the field.

How often during the past season was I asked by tourist, merchant, farmer, prospector, by every one I met that perpetual question 'What is your survey for?' To the average person the need of ordinary surveys for the subdivision of agricultural lands, or defining mineral claims, is at once apparent. But a triangulation survey of the mountains, well, to almost all, the necessity and object of such a survey are incomprehensible.

I would say, therefore, by way of explanation, that the object of this triangulation survey is a purely practical one, viz.: of providing by a system of triangulation a number of permanent reference marks available for the extension, over adjacent areas, of surveys of all kinds—the subdivision of agricultural lands, defining the limits and boundaries of the railway belt, mineral claims, timber limits, &c.,—which are so necessary to the development and administration of all new countries. On account of the mountainous nature of that vast tract of country lying in the

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embrace of the Rocky and Selkirk mountains, the surveys of British Columbia are necessarily of an isolated nature, in contrast with the gigantic system of surveys so admirably developed and extended in the comparatively level provinces of western Canada. The huge framework of the system could not be extended through the mountains, where it was impossible to run base lines. Consequently, to perform required surveys in isolated valleys it was often necessary to run slender and unreliable traverses over many weary and expensive miles. Such a method was of course objectionable, and the difficulty was solved by a triangulation survey which establishes convenient permanent reference points for commencing all kinds of new surveys, and besides forms a bond connecting the main system of Dominion surveys with its outlying parts, making the whole depend upon the same astronomic and geodetic data, and securing a uniformity and consistency for the entire system not otherwise obtainable.

The method of performing such a triangulation survey is as follows:—With the assistance of all existing maps and other information of the country to be embraced by the survey, a system of triangles is projected. The shape of the triangles is dependent only on the rule that no angle of a triangle should be greater than 120° or less than 30° ; the length of the sides of the triangles varies according to the nature of the country, the precision required, and the objects to be gained. In this survey the sides of the triangles are from fifteen to twenty miles in length. A reconnaissance party visits the projected stations, and decides upon their suitability, or chooses other nearby stations in their stead. In this the surveyor in charge of the reconnaissance is guided by many circumstances and conditions, such as: the existence of trails or other feasible routes by which the stations may be reached, the accessibility of the summits, the permanence and suitability of the peaks, (an ice-capped peak will not answer) the prominence of the neighbouring peaks and ranges, the intervisibility of the different stations, and so on; and upon his success in fixing these stations largely depends the ultimate success of the triangulation.

When the stations have been fixed and signals erected horizontal angles are carefully observed at each station. A base line is also located and accurately measured; then by gradually increasing triangles it is projected and extended to the main system. At certain stations astronomical observations for azimuth are taken, and the latitude and longitude also determined. By means of these data, viz.: the linear measurements of the base line, the angular measurements of the triangles carefully weighed and adjusted, and the determination of azimuth, latitude and longitude, there are then calculated the relative positions of all the triangulation stations, and other secondary reference points.

From observed and corrected vertical angles at the different stations may be determined the altitudes above sea-level of all stations, mountain peaks, and other reference points, using certain known altitudes such as the rail-levels of the Canadian Pacific railway as media of reference. Altitudes so calculated are more accurate than those obtained from unreliable and limited aneroid readings.

Each triangulation station on the summit or peak of a mountain is marked in a permanent manner. The permanent mark adopted for this survey consists of a brass bolt six inches long and three-quarters of an inch in diameter, with a flat square head one and one-half inches square and one-half inch thick. This bolt is set in a hole drilled in the rock and firmly fixed by cement. The head of the bolt is stamped with the number of the station in Roman numerals followed by the Greek letter Δ , or triangle; the apex of the triangle faces the north at the centre of the head of the bolt, and is the geodetic point. Besides its number, the station is generally given a name, such as the local name of the peak or range on which the station is situated.

As reference points for accurately determining the position of the permanent mark at any future time, are placed four separate iron bolts, set in holes drilled in the rock and fixed with cement. The bolts are each six feet distant from the geodetic point, and bear respectively north, south, east and west from it. This method of placing

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reference marks was followed as closely as circumstances would permit, and a detailed description of each station was taken and recorded.

Signals for observing upon from other stations were erected as follows: with the geodetic point exactly at the centre of its base a conical stone cairn was built, measuring from six to eight feet in diameter at the base, two feet in diameter at the top, and from six to ten feet high. Surmounting the cairn was placed a truncated cone of tin, two feet in diameter at the base, one foot at the top and two feet high. The top of the signal in each case is vertically above the geodetic point. The individual measurements of each signal were taken and recorded.

The triangulation of the Rocky mountains in the vicinity of the main line of the Canadian Pacific railway and its extension westward within the railway belt, British Columbia, was commenced by Mr. W. S. Drewry, D.L.S., who began operations in the spring of 1889, and carried on the work for four successive seasons. During this time signals were set and angles observed at eighteen stations of a primary system of simple triangles, extending from the fifth initial meridian westward to Mt. King, in township 27, range 19, west of the fifth meridian. The tract embraced by this network is some one hundred and ten miles in length and has an average breadth of twenty miles. For this triangulation a base line about one and one-half miles in length was measured near Cochrane, Alberta, and extended to the main triangulation. Mr. Drewry also established signals westward into the Selkirk range, but here the simple system of triangulation was enlarged, and a double chain of triangles carried across. Eight signals in all were placed, crossing the summit of the Selkirks and reaching as far westward as Twin Butte, ten miles east of Revelstoke. No angles, however, were observed west of Mt. King, and at none of the stations were permanent marks placed.

In the spring of 1893 Mr. Drewry began work on the Alaskan boundary for the British Columbian government, and about the same time a decreasing demand for lands within the railway belt, as well as in the whole of western Canada, resulted in an almost stagnant condition of Dominion surveys for several years, and of course a corresponding decrease in the government survey appropriation. The triangulation survey of the Rocky mountains was consequently discontinued, and remained in abeyance until the renewed activities of the past few years in mining and lumbering operations, and an influx of settlers in the many fertile agricultural and fruit growing valleys of British Columbia showed the necessity of recommencing the triangulation.

My instructions, dated June 2, 1906, read: 'You are to take up the work where it was left by Mr. Drewry, in 1892, as shown on the accompanying diagram, and to extend it westward. The main object of your work during the present season will be to establish permanent marks at the stations which are to be occupied, to erect signals for observing angles next season, and to select a place for measuring a base line. The latter should not be less than five miles.' I left Ottawa on June 5 for Calgary, where I outfitted for the field.

STATION XIV. (STORM MOUNT).

Storm mountain, on whose summit station xiv. is situated, was the first station visited, being on the western limit of the completed portion of the triangulation. It is a high mountain (alt. 10,300 feet) at the summit of the Rockies, on the boundary between the provinces of Alberta and British Columbia. The mountain lies in the southerly portion of township 26, range 15, west of the 5th meridian, and is visible from Castle Mountain railway station, being about six miles distant therefrom in a southwesterly direction. To reach Storm mountain we camped at Castle Mountain railway station, sixteen miles west of Banff, on the left bank of Bow river. There is a good camping ground with excellent pasturage for horses on the small flat between the railway and Castle mountain. By following the old tote road westerly up Bow river for nearly two miles, we discovered an easy ford over the river, which at this date, June 19, was still very low, owing to recent cool weather. The Vermilion trail was connected with at the ford, being about half a mile west of the mouth of

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Vermilion creek. The trail keeps to high ground on the west side of the creek and was in fairly good condition. There are several small lakes along Vermilion creek in one of which we made some fine catches of large Dolly Varden trout. Some good timber still exists along the trail although a great deal has been cut for railway ties. The trail follows the south fork of Vermilion creek to Vermilion pass, a distance of about eight miles from the railway. There are many westerners who still maintain that Vermilion pass offers a better, though longer route for a railway (via Castle mountain, Vermilion pass, Vermilion, Kootenay and Beaverfoot rivers) than the present line of the Canadian Pacific railway over Big Hill or Kicking Horse pass. The altitude of Castle mountain station is 4,660 feet, and that of the summit of Vermilion pass about 5,300 feet, or a difference in elevation of six hundred and forty feet in over seven miles. The grade on the western slope would be even less. The pass is fairly wide with no danger of rock or snowslides.

About half a mile south of the pass, the trail crosses a small stream forming the headwaters of Vermilion river, flowing southerly. Here we pitched camp with Storm mountain lying to the east. The ascent of Storm mountain was made up its south slope. We descended along Vermilion river by trail for one and a half miles to the mouth of a small mountain stream flowing from the south base of Storm mountain. We ascended the small valley of this creek, guided by an old blazed trail, till we reached timber line at the head of the stream. Then attacking the steep snow-covered south slope of the mountain we attained the broad summit of Storm mountain after a climb of five and a half hours. I will not attempt to describe the magnificent panorama which may be seen from this mountain, the ever changing lights and shadows rising and falling on the frowning peaks of rock and the cold bare fields of eternal snow, extending in every direction to the blue horizon. The summit of Storm mountain was covered with three feet of snow, and on the eastern ledge of the peak a huge snow cornice ten feet high hung over the precipice. Drewry's cairn, a silent monument to the sometime presence of man, was in good condition after its fifteen years of solitary vigil. The cairn was covered with snow and the rocks were frost bound, but after considerable prying we managed to reach the bottom of the monument. In a hole drilled in the rock at the true centre of the base of the old cairn was placed a brass bolt (for description see above) fixed in cement. The head of the bolt was stamped with the number of the station in Roman numerals, followed by a triangle with its apex at the centre of the head of the marker. The apex of the triangle is the geodetic point. As reference marks were set four separate iron spikes in the rock, and fixed with cement. Each reference mark is six feet from the geodetic point, and they bear respectively north, south, east and west from it.

Over the permanent mark the conical stone cairn was rebuilt in the same position as before. The cairn measures eight feet in diameter at the base, two feet at the top, and is eight feet high. Surmounting the cairn a truncated cone of tin was placed. It was filled with stones and securely wired to the cairn. The top of the tin signal is ten feet vertically above the geodetic point.

The day of the ascent, June 23, was a clear summer day, and during our five hours stay on the summit our heads were hot and perspiring with the heat of the sun, while our feet were numb with cold. The thermometer registered 72° Fahr. on the summit at 2.30 p.m. The descent to camp was made in two hours and forty-five minutes by a series of rapid glissades, and hurried scrambles over scree and shale. The day after our climb we were attacked with snow blindness, having neglected to take snow glasses with us up the mountain, and the bright and sparkling sun wrought havoc with our eyes. Our faces too were frightfully sunburnt.

There is very little grass for horses in the vicinity of Vermilion pass, although our horses managed to find some pickings along the trail. Game is somewhat scarce, too, in this district, although we saw traces of bear, deer and marten. The trout fishing is excellent, rainbow or cut-throat trout (*Salmo mykiss*) and Dolly Varden trout

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(*Salvelinus malma*) being plentiful in the small lakes and streams, although the fish are such gluttons that to a true angler their capture seems like slaughter.

STATION XVIII.

From Castle mountain the horses were sent to Field, British Columbia, via the old Canadian Pacific Railway tote road over the summit of Kicking Horse pass. The road is in very bad shape, but the trip was made without difficulty. The rest of the outfit was shipped by rail.

To locate station xviii, Mr. Drewry travelled up Amiskwi river which flows into the Kicking Horse just below Emerald river, and in making the ascent of the mountain whereon he set the signal, he had, according to his report, 'a hard, rather dangerous climb.' I learned at Field that the trail up the Amiskwi had not been used for some time, and that station xviii (under which name, by the way, the mountain is locally known) could be much more easily reached via the Yoho valley. Following this advice, we travelled to Emerald lake by an excellent wagon road, a distance of seven miles. Then we followed a well cut trail along the north side of that beautiful lake leading up and over the Yoho pass to Yoho lake (or Summit lake) where the Canadian Alpine Club held its first annual camp this summer. We then followed the upper trail northerly up the Yoho, the trail being cut along the steep sides of Mt. Vice-President and Michael peak almost at timber line. From the high elevation of this trail may be seen some of the grandest scenery in the Rockies, Takakkaw falls, Daly glacier, Mt. Daly, Mt. Balfour and the beautiful Yoho valley. Skirting lake Duchesnay the trail strikes a tributary of Yoho river, and a branch trail turns to the left, and ascends Little Yoho river, passing the broad form of Whaleback mountain, the Habel glacier—with the Isolated peak rising from the ice and snow—and reaches almost to Kiwetinok pass. We pitched camp at an altitude of six thousand feet, beside the Little Yoho, a small mountain brook some fifteen feet wide, with station xviii bearing northwest about two miles. There is a little grass in the valley of the Little Yoho, but in making this trip it is wise to camp at Emerald lake as there is no horse pasturage at Yoho lake or along the upper trail.

The ascent to station xviii was an easy one with very little green timber or brush to retard progress, on account of the high elevation of our camp. Most of the trip was a steady ascent up huge snow-fields, and the summit was reached in three and one-half hours. The whole mountain was covered with deep snow, and a cornice rose on the easterly ledge of the peak to a height of twelve feet. A strong and bitterly cold wind blew all day and during our enforced stay on the summit we suffered horribly from cold, although the thermometer really registered only 20° below freezing point. The wind so shook the transit, too, that good instrumental work was impossible.

The view from station xviii is a grand one, especially over the enormous fields of ice and snow which extend far away to the north and east, the Wapta glacier and névé, the Habel glacier, and the Waputik snow field, and forever guarding the white landscape are the cold stern gendarmes, Mummery, Habel, Collie, Baker, Gordon and Balfour. To the south are the clustered peaks of Kerr, Marpole, President, Vice-President and Michael. In the southwest stretches the thin red line of the Van Horne range; and to the west, the dark green valleys and passes near the Blaeberry stretching northerly to Howse pass.

On the summit of the mountain we found Drewry's cairn in good condition, and at the centre of its base we set the brass permanent mark in a hole drilled in the rock, fixing it firmly with cement. The head of the brassmarker was stamped with the number of the station in Roman numerals, followed by a triangle with its apex at the centre of the square head of the bolt. The apex of the triangle is the geodetic point. Two reference points were placed, being iron bolts, each set in holes drilled in the rock, and fixed with cement. One reference bolt is due south of the geodetic point and is seven feet from it. The other reference bolt is due west of the geodetic

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point, and is six feet six inches from it. No other reference marks were placed owing to the deep snow on the north and east sides.

Over the permanent mark the conical stone cairn was rebuilt in exactly the same position as before. Its dimensions are: seven feet in diameter at the base, two feet at the top and seven feet high. Surmounting the cairn a tin signal was placed as at station xiv. The top of the signal is nine feet vertically above the geodetic point.

We returned to Field as we came, having been absent six days, during which time we had three days' rain with several inches of snow on the third day.

STATION XVII. (MT. KING.)

Station xvii is situated on the summit of Mt. King at the southerly end of Van Horne range. This range of mountains extends from Kicking Horse river near Ottetail in a northwesterly direction to the Blaeberry, and the red colour of the rock makes the range easily distinguishable from a distance. The station lies in the northwest quarter of section 29, township 27, range 19, west of the fifth meridian, and is distant about four miles in a northwest direction from Ottetail railway station.

The mountain is reached from Field by following the Ottetail wagon road down the south side of Kicking Horse river for three or three and one-half miles; then, near the railway siding of Emerald, and about three hundred yards east of a log house by the side of the wagon road, a trail turns off down into the Kicking Horse flats. This trail follows the river for about three miles when the stream may be easily forded. The trail then leads to some old logging shacks on Otterhead river. Another set of loggers' cabins is situated a mile and a half above the first group, and camp should be pitched midway between the two logging camps. There is plenty of grass for horses along the low flats near the mouth of Otterhead river. Some of the timber along this stream has been logged and run to Palliser, but there still remain good limits of spruce, fir and cedar, although nearly all the timber is under license. Moose, deer and bear are plentiful in this vicinity, and a few goat on the mountain.

Mt. King is not an easy mountain to approach as the timber at the base and on the lower slopes is full of windfall. The climb is made easier by following some of the loggers' trails which ascend for a short distance up the lower slopes. The best ascent from the east side is up the bed of a stream which flows into the Otterhead midway between the two groups of logging cabins. The best route then is to follow this draw to its basin, cross over a shoulder to the north, and descend into the basin of the largest creek (called locally Bear creek) which flows from Mt. King into the Otterhead. This basin is the objective point, but the ascent should not be assayed up Bear creek on account of the heavy growth of alder and brush lining that stream. Much arduous toil is saved by commencing the ascent at the proper point. On gaining the basin of Bear creek the remainder of the trip is up a steep arête, which makes an interesting climb. We made the ascent from our camp on the Otterhead in seven hours and a half taking things easy all the way.

We found Drewry's cairn on the summit which is about fifty feet long east and west, but only a narrow ledge of rock north and south, with a sheer drop of five hundred feet on the north side. The cairn was razed, and at the true centre of its base a brass marker was set in the solid rock and fixed with cement. The flat top of the marker was stamped with the number of that station xvii., in Roman numerals, followed by a triangle with its apex at the centre of the head of the marker. The apex of the triangle is the geodetic point. As reference marks three iron bolts were placed in holes drilled in the rock, and fixed with cement. Each bolt is six feet distant from the geodetic point, and they bear respectively south, east and west from it.

Over the permanent mark the conical stone cairn was rebuilt in the same position as before. It measures seven feet in diameter at the base, two feet at the top, and is six feet six inches high. Surmounting the cairn a tin signal was placed. The top of the signal is eight feet six inches vertically above the geodetic point.

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The ascent was made on July 4, and the day was bright and warm, with little or no wind. The thermometer registered 75° Fahr. on the summit at 3 p.m. The peak was covered with a lot of snow, and a huge cornice hung over the northerly ledge. The descent was made in four hours after a very disagreeable trip down the alder-tangled bed of Bear creek.

STATION XIX. (BLAEBERRY).

We next moved to Golden, a small lumber town, lying in the Columbia valley at the mouth of Kicking Horse river and then descended the Columbia valley about eight miles by wagon road to the flag station of Moberly.

Just west of Moberly siding there is a tract of land some eight hundred acres in extent, lying between the railway and Columbia river, part of which is muskeg and part good hay land, but mostly inundated at high water during July and August, and the greater portion of September. An optimistic outsider has purchased this land, and intends to attempt some extensive dyking and draining, although the neighbouring ranchers between Golden and Moberly cast doubt upon the feasibility of the scheme; they claim that it is impossible to drain off the abnormal seepage from the mountains as most of the land is lower than the bed of the Columbia. The enterprise should be watched with great interest, for on its success depends to a large degree the redemption of the extensive bottom-lands along Columbia river.

There are several prosperous ranchers between Golden and the Blaeberry, and excellent timber on the west side of the Columbia, some of which is being logged and run down to a sawmill at Beavermouth. There is a good site for a sawmill at the mouth of Blaeberry river, and the timber up that river is unexcelled in quality, fir, cedar and spruce growing thick, straight and sound, and of a convenient size for logging and driving. Most of the timber is on the east side of the river, that on the west side for a dozen miles being mostly burnt. The Blaeberry is a grand game district, moose, caribou, deer, bear and goat being plentiful, and at no distance from the railway.

Blaeberry river is a rapid glacial stream heading at the Howse pass. It has an average width of forty feet, and a depth of three feet, and runs nearly eight miles per hour. The valley is from half a mile to a mile in width, and in some places the river runs through gravel flats, although at about nine miles from the railway it emerges from a narrow canyon which extends for six or seven miles up the river. There is very little grass for pasturage after leaving the Columbia valley until this canyon is passed.

A good pack trail follows the east side of the Blaeberry from the Columbia, commencing just east of the Blaeberry railway bridge, although about half a mile west of Moberly, and a mile and a half east of the mouth of the Blaeberry, a trail turns off the old tote road and joins the main Blaeberry trail about three miles up the river. The mountain on which Mr. Drewry placed his cairn is on the west side of the river, and by the use of field-glasses the stone monument is visible from the trail. We ascended the Blaeberry about six miles, forded the stream at some shingle flats, and followed the west side of the river for about two miles and a half, cutting trail as we went. The ascent to the Blaeberry cairn was made via the southern slope of the mountain, up a wooded ridge covered with *brulé* and windfall, which made the trip to the timber line very fatiguing. Above the limit of vegetation the ascent was quite easy, and the broad summit of the mountain was gained after a six hours climb.

Station xix (Blaeberry) was marked with the usual brass marker, set flush in the rock, and fixed with cement. The head of the marker was stamped with the number of the triangulation station in Roman numerals, followed by a triangle with its apex at the centre of the head. The apex of the triangle is the geodetic point. As reference marks four several iron bolts were set in the rock, and fixed with cement. The bolts are each six feet from the geodetic point, and bear respectively north, south, east and west from it. Over the permanent mark a conical stone cairn was built, seven feet in diameter at the base, two feet at the top, and six feet high. Surmounting the cairn the usual tin signal was placed for observing upon. The top of the

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signal is eight feet vertically above the geodetic point. I afterwards discovered at some of the stations subsequently visited, that the Blaeberry signal is very hard to discern, and would perhaps be better situated on a more prominent mountain lying to the northeast of the station as at present located.

The descent from the mountain was made in three hours; we saw a herd of mountain goat which allowed us to approach to within fifty yards. During our six days sojourn in the Blaeberry country we had three days' rain. During the other three days the weather was extremely hot, and mosquitoes were somewhat troublesome.

STATION XX (BEAVERFOOT).

After returning to Golden, we journeyed up the Columbia valley by the Government wagon road, our objective point being a cairn on the Beaverfoot range in township 24, range 19, west of the fifth meridian. The Beaverfoot mountains lie between Columbia and Beaverfoot rivers, and extend from Kicking Horse river in a southeasterly direction. Between this range and the Dogtooth mountains on the west side of Columbia river, Columbia valley is low and flat and about two miles wide. The river is broad and slow of current, with numerous side channels, and during the greater part of the summer floods nearly all the low hay lands in the valley to a depth of three or four feet. When the water recedes in the autumn, the farmers cut a great abundance of slough hay from the wet meadows. This hay when left uncut and protected by snow affords good pasturage for horses and cattle all winter, but when cut, it dries very quickly, and even when mixed with salt does not contain much nutriment. On the uplands of the valley the soil is sandy and dry, even gravelly, and needs irrigating for which plenty of water may be obtained in the many streams flowing from the mountains. The timber is mostly small poplar and birch, which is easily cleared, although on the lower ridges of the mountains good fir is found, most of which is under license, and is at present being cut for railway ties. There are a number of good farms for seven miles above Golden, then six miles or so of poor land, when the farms recommence and extend for one hundred miles up the valley. None of the land on the west side of the valley is taken up, as there is no wagon road tapping it. The Kootenay Central railway a branch line of the Canadian Pacific railway which will connect Golden with the upper Kootenay and the Crowsnest, has ten miles of its line under construction, but from what information I could gather I fear the inhabitants of the valley will have to wait some years yet before the line is completed and trains running. A weekly stage runs from Golden to Windermere, and a large flat bottomed steamer navigates the sand bars of the river during the summer months between Golden, Spillimacheen and Windermere carrying freight, and passengers who are not in a hurry.

It seems to me that the fruit industry, especially the hardy fruits, might be developed in this part of the Columbia valley. The sandy soil is suitable for fruit growing, and the protection which Beaverfoot mountains afford from the early sun would prevent destruction from frosts. Already some of the more enterprising farmers have experimented with some of the hardy fruits, and although the trees are still young, they are healthy and vigorous and bear good showings of apples, crab apples and plums. The valley also produces an abundance of strawberries, gooseberries, red currants and black currants, besides ordinary garden produce. Wild strawberries, raspberries, blueberries and service berries also grow in profusion.

The west boundary of Yoho Park reserve runs between ranges 19 and 20, west of the fifth meridian, to the south limit of the railway belt. There is a strip of excellent farming land therefore lying within the park, which cuts the valley like a wedge. I would respectfully point out that if the western boundary of Yoho Park was here altered and made to run along the western base of the Beaverfoot range of mountains from township 25, range 20, to the south limit of the railway belt, instead of along the astronomic meridian at present forming the boundary, the objects for which the park

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was extended would not be affected, but rather assisted, and, moreover, a goodly strip of agricultural and fruit raising land thrown open to settlers.

Drewry's cairn on the Beaverfoot range was found by means of field glasses, and camp was pitched near the wagon road about twenty-nine miles from Golden, with the cairn bearing N. 30° E., and distant about three miles. On crossing the lower ridges of the mountain through heavy timber, the main slope was reached and an easy ascent accomplished up a rocky spur facing the Columbia. By following well beaten goat trails we soon gained the grassy meadows at timber line and attained the summit of the mountain (alt. about 8,700 feet). While on the mountain we saw nearly thirty mountain goats, some of which were very shy, while others allowed approach to within fifty feet and moved away only when we hurled stones at them.

Station xx was marked with the orthodox brass bolt set flush in the solid rock and fixed with cement. The flat head of the marker was stamped with the number of the triangulation station in Roman numerals, followed by a triangle with its apex at the centre of the head of the marker. The apex of the triangle is the geodetic point. For reference marks four several iron bolts were cemented in holes drilled in the rock. The bolts are each six feet from the geodetic point, and bear respectively north, south, east and west from it.

Over the permanent mark a conical stone cairn was built, six feet in diameter at the base, two feet at the top and seven feet high. Surmounting the cairn the customary tin signal was placed. The top of the signal is nine feet vertically above the geodetic point. The summit of the mountain on which the station is situated is a long narrow one extending in the southeasterly direction of the range, and consists of three conjoined peaks. The rock at the summit is composed mostly of gray syenite-gneiss, and in consequence of the gray colour of the cairn this station is not readily discerned from a distance, especially from the direction of Spillimacheen. Subsequently I clothed the cairn with a mantle of white paint.

STATION XXI. (SPILLIMACHEEN).

From our camp near the Beaverfoot triangulation station we returned to Carbonate Landing, seventeen miles from Golden. Here Columbia river was crossed to the west side by means of a row boat, the horses swimming the main channel. At this season of the year, July 21st, the river was very high, and covered the bottom lands of the valley, narrow fringes of cottonwood and willow alone breaking the broad expanse of water. Carbonate landing some years ago was the lively gateway to the Spillimacheen, McMurdo and Lardo mines, but operations in these mining districts are now suspended, the landing is deserted, the ferry has disappeared, and the old hotel on the west bank of the river habited only by porcupines and pack-rats. Gold-bearing quartz has been discovered up the Spillimacheen, but not of a high grade, also argentiferous galena and copper pyrites in sufficient quantities to merit development if good shipping facilities could be obtained.

A good pack trail leads from Carbonate landing to a low pass at the southerly end of the Dogtooth mountains, a distance of five miles. Here the trail forks, the left branch descending to the middle and south forks of Spillimacheen river, and the right branch of the trail dropping gradually for about one thousand feet to Loon lake, a distance of four and one-half miles. This branch of the trail follows the left bank of the north fork of the Spillimacheen for about thirty miles to the pass at the heads of the north fork and Grizzly creek, where it connects with Grizzly trail, and finally emerges at the railway at Bear creek station.

For about twenty-five miles from the mouth of Spillimacheen river, which empties into the Columbia some forty miles above Golden, the Spillimacheen valley is very broad with low timbered ridges and hills holding excellent timber, some of which is now being logged. Farther up the valley the several forks and smaller confluent of the river are separated by high ranges of mountains pointing down the valley like huge inverted wedges. Here the timber is of less value.

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The valley of the north fork is separated from Canyon creek on the north by a range of mountains from seven thousand to eight thousand feet high. Between the north and middle forks the watershed is low for about thirty miles from the Columbia, when the mountains increase in height, rising to an altitude of eight thousand to nine thousand feet. On the first bald mountain of this range lying between the north and middle forks, triangulation station No. xxi. (Spillimacheen) is situated, the cairn lying in the southeast quarter of section 25, township 24, range 22, west of the fifth meridian. The station may be reached from either the middle fork or north fork trail. We ascended to the cairn from a point on the north fork trail about seventeen miles from Carbonate landing, and were obliged to cross the north fork by means of a small raft, for although the stream is only some thirty feet wide, and three feet deep, the rapid current rendered fording impossible without a generous soaking. The ascent to the cairn was a comparatively easy one, being made up a rock slide on the north side of the mountain, and was accomplished in less than four hours (alt. 8,500 feet).

At station xxi. the customary brass marker was set and cemented in the rock, and stamped with the number of the triangulation station in Roman numerals, followed by a triangle with its apex at the centre of the head of the bolt. The apex of the triangle is the geodetic point. For reference marks four several iron bolts were set in the rock and firmly cemented. The bolts are each six feet from the geodetic point, and bear respectively north, south, east and west from it. Over the permanent mark a conical stone cairn was built, measuring six feet in diameter at the base, two feet at the top, and six feet six inches high. Surmounting the cairn the usual tin signal was placed. The top of the signal is eight feet six inches vertically above the geodetic point.

STATION XXII. (NORTH FORK).

We continued up the North Fork trail, which was in bad condition with windfall, necessitating a great deal of chopping of dry logs, and progress was therefore rather slow. At about twenty-three miles from Carbonate a pack trail turns off to the left up McMurdo creek, a tributary of the north fork of the Spillimacheen, flowing from the south through a narrow gap in the mountains. Ten miles farther on, the trail and the valley bend northerly, with Bald mountain on the west, a prairie-like hill some 7,500 feet in height, dividing the north fork from Beaver river, and extending nine or ten miles to the north as far as Grizzly creek summit; while on our right hand as we advanced up the valley, lay the large mountain on which Mr. Drewry's 'North Fork' cairn was situated. Along the north base of this mountain flows Baird brook, a glacial stream fifteen feet wide, entering the north fork about five miles from Grizzly creek pass. From this brook, which is somewhat larger than the north fork, the latter stream takes its milky colour. We camped at the junction of the two streams, at an altitude of 5,800 feet.

There are a few patches of grass along the north fork which serve as pasture for packhorses, and camping grounds must depend on these. The soil is mostly sandy and covered with jackpine. Game is scarce all through the valley except for a few grouse. On Bald mountain, however, caribou are plentiful, and smaller game as well.

The ascent to the sharp peak of station xxii. is an easy one—the best route being up Board brook for about a mile and a half to a large slide on the north side of the mountain, where a gradual slope leads to the summit (alt. 9,000 feet). The orthodox brass marker was cemented in a hole drilled in the rock. The bolt was stamped with the number of the station in Roman numerals, followed by a triangle with its apex at the centre of the head. The apex of the triangle is the geodetic point. For reference marks were placed four several iron bolts cemented in in holes drilled in the rock. The bolts are each six feet from the geodetic point, and bear respectively north, south, east and west from it. A conical stone cairn was built over the permanent mark. It measures six feet in diameter at the base, two feet at the top,

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and is six feet high. Surmounting the cairn the usual tin signal was placed. The top of the signal is eight feet vertically above the geodetic point.

The view from the sharp peak on which station xxii. is situated in an exceptionally grand one, the many ranges of mountains to the north and east appearing low and scattered in contrast with the awe-inspiring black mountains and white glaciers—the monarchs of the Selkirks—which tower above the plateau-like Bald mountain in the west. The grandeur of Mount Sir Donald as seen from the many view points along the Canadian Pacific railway has been extolled by mountaineer and tourist, but to really appreciate its massive beauty one must gaze with cold dread upon its eastern form. Cold and bleak the dark mass rises almost precipitously from Beaver river, while clustered about stand Mts. Macdonald, Avalanche, Uto, Eagle, Macoun, Donkin, Bonney, Dawson, Kilpatrick, and Wheeler, in dark contrast to the dazzling blue and white of countless glaciers, and the clear outline of the trackless Deville and Illecillewaet névés.

The great precipitation of snow and rain which falls in Spillimacheen valley, and the cold wave which nightly visits that district are doubtless caused by those immense fields of snow and rivers of ice, and the giant peaks which pierce the clouds. Our work in the Spillimacheen was greatly retarded by rain and snowstorms. We lost several days at Station xxi., and were forced to make ascents to Station xxii. At the latter cairn we were twice caught in a snowstorm which rendered it dangerous as well as disagreeable on the mountain top.

On leaving our camp near Station xxii. we advanced five miles up the North Fork trail to the low grassy summit of Grizzly creek, (alt. 6,700 feet) where the waters of the north fork and the west branch of Grizzly creek head not more than twenty-five yards apart. The summit of the pass is covered with luxuriant grass affording excellent pasturage for horses, while the bright gay colours of the many species of mountain wild flowers added greatly to the beauty of the spot. The Grizzly trail had not been travelled by horses for several years, and was littered with fallen trees most of which had to be cut out, as the trail runs along the steep mountain side so that there was no getting around obstacles which barred our passage. The trail follows the left side of the west branch of Grizzly creek high up on the hillside, but gradually descends until at about nine miles from the pass the level of the main creek is reached. Here we were obliged to ford the stream as the old bridge had been washed away by the tempestuous glacial creek. The trail then follows the right bank of the stream westerly for two miles, when a branch trail turns off to the south, crosses the Grizzly, and ascends Beaver valley. The main trail here swings to the north and descends the right or east side of Beaver river for two and one-half miles where it crosses the rapid stream by a new bridge. Then descending along the left bank for half a mile it crosses the mouth of Bear creek and commences to ascend the mountain side to quickly emerge at Bear Creek railway station.

From Bear Creek there is no trail or tote road either up or down the railway, although there is not much trouble in taking horses up the track to Rogers pass, six miles away, and from there to Glacier. Northerly from Bear Creek it is impracticable to conduct horses on account of the high bridges by which the railway crosses the many turbulent mountain streams running through deep canyons.

STATION XXIII. (BEAVERMOUTH.)

The next triangulation station visited was 'Beavermouth' cairn which is reached from the railway station of that name. Beavermouth is a small lumbering hamlet lying in Columbia valley where Beaver river enters the Columbia just as the latter turns northward to the Big Bend. The valley near Beavermouth is rather narrow, the river flowing close to the base of a mountain on the north side so that the only bottom lands are on the south side of the river. These bottom lands are low and marshy and are superb breeding places for myriads of mosquitoes, which made our lives miserable during our sojourn in this vicinity in the early part of August. Never

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have I suffered so much from the onslaughts of these female pests, not even among the sloughs on the British Columbian coast nor in the muskegs of Alberta. And for many a day I shall vividly recollect the frantic time we spent at Beavermouth endeavouring to snatch a few mouthfuls of food under our veils, and attempting to woo Morpheus with our lungs full of smoke from smudge-fires.

At Beavermouth there is a sawmill which is in operation most of the season, with a dozen to twenty houses for the mill hands, but there is no store or hotel. Quartz creek flows into the Columbia here from the south, but the old trail up the creek has not been used for many years and is now impassable for horses, as the auriferous quartz found up the creek did not turn out to be sufficiently rich to pay. There is good timber both up and down the Columbia, up Beaver valley, and on the lower slopes of all the mountains. Game is fairly plentiful in this vicinity, there being many bear in Beaver valley and deer in the mountains.

Immediately south of Beavermouth, and on the most northerly mountain of a low range lying between Quartz creek and Beaver river lay Drewry's cairn, to reach which we had to make a long and wearisome ascent of 4,500 feet through timber, brush and berry bushes and for a distance of over four miles before reaching timber-line; and I invoked blessings on Mr. Drewry for blazing the route through the dense timber. Although the station is situated on a very low mountain, at an altitude of only 7,250 feet, it is admirably located for the purposes of triangulation, as there are no mountains obstructing the line of sight towards 'Blaeberry,' 'North Fork,' and 'Bonney' and an uninterrupted view is obtained up the valley of Mountain creek, which solved the difficulty of carrying the triangulation across the summit of the Selkirks.

Station xxiii was marked with the customary brass bolt cemented in a hole drilled in the rock. The bolt was stamped with the number of the triangulation station in Roman numerals, followed by a triangle having its apex at the centre of the head of the bolt. The apex of the triangle is the geodetic point. For reference points were placed four several iron bolts cemented in holes drilled in the rock. The bolts are each six feet from the geodetic point, and bear respectively north, south, east and west from it.

Surmounting the permanent mark a conical stone cairn was built, seven feet in diameter at the base, two feet at the top and eight feet high. The usual tin signal was placed over the cairn. The top of the signal is ten feet vertically above the geodetic point. The summit of the mountain is low and broad, and to make the signal easily discernible from a distance the cairn was painted white.

STATION XXV (MT. BONNEY).

From Beavermouth we journeyed by rail to Glacier, where I made enquiries from the Swiss guides employed by the Canadian Pacific Railway company as to the best route for ascending Mt. Bonney, for I had come to the conclusion that a triangulation station on that lofty mountain was almost a necessity. From Edouard Feuz the veteran Swiss mountaineer, who already has had a wide experience amongst the Selkirks I learned that the only ascents of Mount Bonney which have been accomplished were made either via Loop creek and Mount Green, or by way of the Asulkan pass and Mount Swanzy; yet he was firmly of the conviction that the best ascent of Mount Bonney was to be made from the south side and would prove a most interesting climb. As it was necessary for me to ascend Flat creek pass, which lies south of Mount Bonney, in order to make an official visit to the hitherto invisible cairn 'Incomappleux,' as well as to reach Battle Creek cairn, I decided to follow the guide's advice. Consequently we left Glacier for Flat Creek siding, a distance of nine miles by trail. From Glacier a trail leads down past the great Loop to near Cougar creek, this trail having been recently cut out by the Canadian Pacific Railway company in order to reach the wonderful caves near Cougar creek. The last few miles to Flat Creek siding had to be made along the railway track, and I might remark, by way of parenthesis, that one of the most unpleasant duties of the season's work was driving impish pack horses

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along the railway track. Between Donald and Revelstoke there is no trail or tote road, and to go from one intermediate point to another it is necessary either to ship by rail, or to 'count the ties.' And a day's journey with pack horses along the railway track, with incessant dodging into narrow ditches to escape destruction from unexpected trains, well, the trials of such a day were enough to tax the temper of a saint.

Flat creek, a mountain stream about fifteen feet wide, flows into Illecillewaet river from the south almost opposite Caribou creek. A good trail follows the east side of this creek in a southerly direction for five and one-half miles to the summit. The first three miles is through good heavy timber, but as the summit is neared the valley is comparatively open. Slick creek also heads at the pass and flows in a southeasterly direction for three and one-half miles into Incomappleux river. Flat creek pass has an altitude of four thousand nine hundred and fifty feet, is about a half mile wide, and covered with luxuriant grass. Mountains rise on the east and west sides about 3,300 feet above the pass, and their lower slopes are covered with heavy green timber. Berries grow along the pass and lower slopes of the mountains in great abundance, and from the middle to the end of August attain perfection. Red raspberries, wild gooseberries, black currants and blueberries are plentiful, a delicious large black species of huckleberry (*Vaccinium Myrtilloides*) being most abundant.

We found the Incomappleux cairn on the mountain to the east of the pass, and it was undoubtedly evident that the cairn could not be used for a triangulation station as neither 'Beavermouth' nor 'North Fork' cairn was visible therefrom.

As Mount Bonney has been ascended on only a very few occasions and is considered one of the worthy climbs in the Selkirks it may perhaps be interesting to describe this first ascent from the south side. Leaving our camp on Flat Creek pass we took a small silk tent, blankets, food for three days, and a few cooking utensils besides our usual load of a transit, camera, tripod, brass marker, reference bolts, drill, drilling hammer, cement, tin signal, wire, &c., which made good packs for the three of us. On account of the high altitude of our starting point we were soon out of the dense timber and brush and in two hours and a half after leaving camp we reached timber line of the mountain lying east of the pass. From this elevation we could see the huge form of Mount Bonney lying about four miles away in a northeasterly direction. The three conjoined peaks just emerged from the immense glacier and névé which covered the whole face of the mountain, except where a long ridge or arête extended from the easterly end of the summit and sloped gently down in a southerly direction towards Incomappleux river, separating Bonney névé from Clarke glacier. This arête seemed to be the objective point for our ascent. We crossed the small snowfield which lay on the western slope of the mountain on which we stood, and dropped over the northeasterly side of the mountain, down a glacier and couloir, which led us past precipitous rock faces over tumbled masses of fallen rock across a wonderful quarry of creamy pink marble, down into a beautiful alpine meadow. Through the pale grasses of this meadow we advanced northeasterly for a mile. We met a herd of mountain goats in the meadow, but our arrival and strange appearance did not seem to disturb these phlegmatic animals for they merely stopped feeding as we approached, and watched us with a passive interest; and not until we were within a hundred feet did they decide to depart then quietly turned about and walked slowly away some of them even grazing and cropping as they went.

As we neared the main base of Mount Bonney our progress was stopped by a deep gulch through which ran a stream heading from the glacier on the south side of the mountain, and flowing in a southerly direction being part of the headwaters of the Incomappleux. It was now two o'clock in the afternoon so we decided to camp in the alpine meadow we had just crossed. We took off our packs, and pitched our tents beside a small trickling brook, and in the shelter of a group of stunted fir. Soon we had a roaring log fire ablaze and its warmth was greatly appreciated as the air grew quite chilly at this high altitude (7,000 feet) as soon as the early sun disappeared behind the western peaks.

Leaving our little camp in the meadow at six a.m. (August 22nd), we followed the edge of the deep gulch separating us from Mt. Bonney, until we gained the head of

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the stream at the tongue of the glacier. Crossing the stream we skirted back on the left or east side of the gulch for half a mile, when we commenced the rocky ascent of the ridge where we had decided the easiest ascent was to be found. On this mountain, as indeed in all our climbs, we failed to show the true mountaineering spirit, which, I am told, has a penchant for seeking the most difficult routes of ascent; instead, we always carefully searched for the safest and easiest route. After ascending some twelve hundred feet we reached the edge of the arête between Bonney névé and Clarke glacier. We then struck northerly along the narrow ridge of rock, and when possible walked briskly on the crisp snow of the sloping névé. After a steady pull of two hours and a half (the whole ascent from our flying camp occupying five hours) we reached the summit of Mt. Bonney (altitude 10,205 feet), and such a view! Fields of snow and rivers of ice, some of the largest névés known to man, extended to the north, the east and the south. Illecillewaet, Deville, Van Horne and Bonney névés, and the mighty glaciers below these tracts of snow. The highest peaks of the Selkirks clustered around—Duncan, Purity, Wheeler, Dawson, Fox and Sir Donald. To the north was the Hermit range, with the Swiss peaks and the Camels. Far away to the northwest stood a heterogeneous mass of snowy mountains, yet unnamed and yet unwon. Like mere plateaus in the undulating valley appeared Mts. Afton and Abbott, those worthy climbs from Glacier House. Five hundred feet below our feet over the precipitous northern ledge of the summit lay Bonney glacier, from which flowed a small creek towards and under the great loop of the railway whose snake-like form we could discern in the distance. The summit of Mt. Bonney extends for two hundred feet east and west, but it is a mere ledge of rock north and south. It is composed of three united peaks of almost equal height, the middle one, however, having the advantage by a few feet.

Station xxv. is situated on the summit of Mt. Bonney, in the Selkirk range, at an altitude of 10,205 feet. It lies in section 10, township 26, range 26, west of the fifth meridian. The station is marked by the customary brass bolt set and cemented in a hole drilled in the rock. The head of the marker is stamped with the number of the triangulation station in Roman numerals, followed by a triangle with its apex at the centre of the head of the bolt. The apex of the triangle is the geodetic point. For reference marks were placed two iron bolts set and cemented in holes drilled in the rock. The bolts are each six feet from the geodetic point, and bear respectively north and east from it. Two other reference points were also marked at this station, being crosses cut in the rock; the centre of each cross is six feet from the geodetic point, and they bear respectively south and west from it. Over the permanent mark a conical stone cairn was built, six feet in diameter at the base, two feet at the top, and six feet six inches high. Surmounting the cairn the customary tin signal was placed. The top of the signal is eight feet six inches vertically above the geodetic point.

The day of the ascent was fine and warm, with very little wind. The thermometer registered 97° Fahr. at the summit at 2 p.m. The descent to our flying camp in the Alpine meadow was made in three hours, and thence to the main camp in Flat Creek pass in four hours.

From Flat Creek pass we set out for Battle Creek to seek the cairn set by Mr. Drewry in the vicinity of that creek, although I had been unable to discover it from any station already occupied. The trail followed the west side of Slick creek, and about two and a half miles from the pass Jeopardy slide was met, which the trail crossed and descended by many switch-backs cut in the steep slide overgrown with alder, devil's club and other brush. At the slide a branch trail turned off to the right leading up to some mining claims which are being developed near the head of Bain brook. At these claims, and some on Incomappleux river, a high grade argentiferous galena ore is found, and these mines should prove to be paying propositions in the near future.

At about four and one-half miles from the pass the bed of Incomappleux river was gained, the river here flowing through gravel flats about fifty yards wide. The

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trail crossed the mouth of Bain brook, and followed the west shore of the Incomappleux for one and one-half miles to a narrow gorge in the river, where some old stringers showed us that a bridge had once spanned the stream. As it was impossible to cross the rushing river at this point, we retraced our steps half a mile, and forded the stream at the shingle flats. The trail ran along the east side of the river, crossing the broad slides where huge avalanches had carried away every vestige of green timber. These slides were overgrown with a rank entanglement of alder thicket, devil's club, nettles and brush, growing over five feet high, through which search for the trail was a trying task. After six miles of the most disagreeable travelling we had experienced all summer we reached Battle creek, thirteen miles from Flat Creek pass. Battle creek is a large tributary of Incomappleux river, flowing into it from the east; it rises from several large glaciers near the head of Beaver and Duncan rivers, and is a rapid stream some twenty-five feet wide, flowing mostly through rocky canyons. The bridge over Battle creek was gone, and we set our main camp on the north side of the creek near the trail. Some grass for horses may be found on the slides along a great part of the trail; and several small meadows along the Incomappleux, just below Battle creek, afford good pasturage for horses. These meadows are the haunts of herds of caribou and elk. Bears, too, are plentiful throughout the valleys of the last mentioned streams, especially in the month of August, when the many species of berries are ripe. There is some good timber along the Incomappleux, which it might be possible to drive to the Arrow lakes, in spite of the rapids and falls in the river. There is one fall of fifty feet on the Incomappleux about three-quarters of a mile above Battle creek. I saw some enormous cedar trees in the Incomappleux valley fully ten feet in diameter, but they were mostly rotten at the centre.

After making a tentative ascent of a mountain near our main camp at Battle creek, we took packs on our backs and went up the left side of the creek through very rough country. About three miles from the mouth of the stream we ascended to the timber line of a range of mountains lying south of the creek, called Battle range. From the peak of one of these mountains I searched in vain for Mr. Drewry's cairn, which he placed in this vicinity. Every mountain for miles around I swept with telescope and field-glasses, and soon came to the conclusion that the cairn no longer existed. An enormous mass of tumbled rock showed where a high peak had once stood, but now lay scattered and fallen on the neighbouring slopes. I placed a reference cairn on a high mountain to the east, but as neither station xxi nor xxii was visible therefrom, no permanent mark was set. I was unable to locate any of the peaks I had seen from 'Spillimacheen' and 'North Fork' cairns, but am of the conviction that a satisfactory location of station xxiv can be found near the heads of Beaver and Duncan rivers. On giving up the hope that anything further could be accomplished in the vicinity of Battle creek, we returned to Flat creek siding, whence the horses were sent to Albert Canyon along the railway track. From Albert Canyon, a wagon road follows the north fork of Illecillewaet river for twenty-nine miles, to the summit of the north fork and Downie creek, where the Waverley and Tangier mines are located. The wagon road was built at great expense by the provincial government to encourage the development of the mines, but after a considerable sum of money had been spent by the English syndicate which had bought the Waverley mine, and after gross mismanagement, and even misappropriation of funds, if we are to believe the tales that are told, the mine was closed without shipping any ore. The Lanark mines at Laurie, a pretty little mining town between Flat creek and Albert canyon, have a somewhat similar history. By sad experience it has been learned that Canadian mines cannot be successfully operated from Picaadilly, and the present dormant condition of British Columbia mining is the sorrowful result. I understand, however, that the Waverley, Tangier and Lanark properties are all considered good propositions, and I saw excellent specimens of argentiferous galena from these and other mines, on the north fork of the Illecillewaet, Corbin pass, Bain brook and the Incomappleux. The impetus given to British Columbia mining during the last year especially in Rossland and the lower Kootenays, leads me to believe that the next few years will see renewed ac-

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tivity all through the province, although it is difficult to conjecture just what effect the present boom in Cobalt will have on British Columbia. Will the much-needed capital be diverted to the wonderful silver district in northern Ontario, or rather will not confidence be awakened in all Canadian mining?

STATION XXVI (ILLECILLEWAET).

The Illecillewaet valley at Albert Canyon railway station is about half a mile wide, and there are here a couple of prosperous farms. A mineral spring with water of tepid temperature, gushes from the base of a mountain quite close to the village. The wagon road leading up the north fork of the Illecillewaet crosses the main branch of the Illecillewaet, about one and one-half miles from the railway, by a wooden bridge, then swings to the left towards the north fork, whose mouth is one-half mile below the bridge. The road then follows the east side of the north fork for about three miles, crosses the stream by another bridge, and continues up the west side of the river for five miles through some excellent stretches of spruce, hemlock, cedar and fir. In several places gumbo slides had cut away the road and we had to hack out a trail with mattocks. At about nine miles from the railway the road again crosses the river, at a brokendown log stopping house, locally known as 'Klondike,' and from here to the summit the road follows the east side of the stream. The north fork is a rapid glacial stream from twenty to fifty feet wide, with an average depth of three feet. In its lower waters small trout abound. The valley is comparatively narrow with good timber on both sides. The mountains guarding the west are stern and forbidding, rising about nine thousand feet high, and mostly laden with snow. Those on the east have a gentler appearance from the valley, except the snow-capped Corbin peak, and in many green meadows near the timber-line herds of caribou range. Bear, too, are plentiful, and cougar have been seen.

At about six miles from 'Klondike' we arrived at another log stopping place called 'The Farm.' Here we camped to spy out the mountains, and after some tentative climbs on neighbouring peaks in order to locate a satisfactory station, I decided on a mountain lying N. 30° E., from the old hotel. After an easy ascent to the summit, I placed station xxvi. (Illecillewaet) with the usual brass marker set and cemented in the rock. The marker was stamped with the number of the station in Roman numerals, followed by a triangle with its apex at the centre of the head of the bolt. The apex of the triangle is the geodetic point. For reference marks were set and cemented in the rock four several iron bolts. The bolts are each six feet from the geodetic point, and bear respectively north, south, east and west from it. Over the permanent mark was built a conical stone cairn, six feet in diameter at the base, two feet at the top and six feet high. Surmounting the cairn the usual tin signal was placed, and the cairn draped with white cotton. The top of the signal is eight feet vertically above the geodetic point.

During our stay up the valley of the north fork we were troubled with incessant rains, and fresh snow on the mountains.

STATION XXVII. (ALBERT).

Returning to Albert Canyon we moved by pack horses down the railway track a distance of ten miles to Twin Butte bridge, where by a bridge sixty-five feet high the railway crosses the small twin creeks flowing from the south into the Illecillewaet. There was no horse feed in this vicinity, so I sent the horses back to Albert Canyon in care of two men. We ascended a mountain lying in the northeasterly bend of Twin creek east, and found Drewry's cairn on a spur of the mountain along whose base the railway runs. I set a cairn and signal for station xxvii on a higher peak to the east, but did not place a permanent mark, as the final position of this station depends on the alteration of station xxiv, as well as on the yet unlocated stations westwards towards Revelstoke. While on the mountain setting this station, we were caught in a

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snowstorm which kept us up above for two days, during which time we suffered considerably from the wet and cold. The descent of the mountain through the fresh deep snow was extremely disagreeable and trying especially as we were encumbered with heavy packs.

From our experience on the west slope of the Selkirks I should say that the early part of the season is the only time of the year to accomplish satisfactory triangulation work in this district, for the precipitation here from the moisture-laden winds from the Pacific is enormous, especially during the month of September.

BASE LINE.

As it was now about October 1, and the season for mountain work pretty well advanced, I decided to return to the Columbia valley to attend to the important work of selecting a place for measuring a base line, which according to my instructions 'should not be less than five miles.' From what I had seen of the mountainous country between Revelstoke and the eastern slope of the Rockies, I was fully aware that it would be no easy task to find a stretch of country which would give a straight line five miles in length whose extent would be comparatively level and unbroken by wide channels or marshes. With the base line in view all season, I had carefully looked over all the country through which we passed, and had decided that the only available solution was to be found in the Columbia valley between Donald and the south limit of the railway belt, a distance of some fifty miles. I hoped to obtain a dry level stretch of five miles along the bottom lands of Columbia river, for I had been assured that all the sloughs would dry out in the fall. Dry out they did, sufficiently to allow the farmers to cut slough hay along the edges, but it was a different proposition when it came to lay out a Euclidian line five miles in length. The presence of bullrushes and marsh grasses, the muskrat domes, and flocks of wild ducks and geese were indisputable evidence that the water would remain until the frost and snow came. However the familiarity I had gained with the country, assisted by maps and previous surveys at length enabled me to locate a satisfactory line along the edges of the bottom lands of the Columbia about twenty-one miles above the town of Golden. The base line as established measures approximately 427.88 chains, chained with a steel tape; the line lies along the right shore of Columbia river near the wagon road, in townships 24, ranges 19 and 20, west of the fifth meridian. It runs mostly through small poplar and birch with occasional patches of spruce and fir. The mountains on each side of the valley are exceptionally suitable for extending the base to the main triangulation by three or four intermediate stations. Temporary marks and signals were erected on the base in preparation for linear and angular measurements next season.

STATION XXVII. (ALBERT).

The survey season for mountain work is very short, extending from the first or second week in June until the middle of October, for after the latter date the fresh snow which nightly falls on the mountains renders distant signals invisible besides making climbing disagreeable and dangerous. During the season the work of the survey is greatly retarded by rains and cloudy weather, and when much travelling is done it is rather difficult to make good use of such fine days as are suitable for climbing and observing. During the latter half of the month of June, near the summit of the Rockies, it rained seven days. In July, while we were in Columbia valley, and up the north fork of the Spillimacheen, it rained twelve days. In August at Beaver-mouth, Incomappleux and Flat creeks, we had beautiful weather, with only eight days rain. But in September, on the western slope of the Selkirks we had only ten fine days all month. In the Columbia valley during the month of October, we had twelve days on which it rained, eight days were more or less cloudy and unsuitable for mountain work while the remaining eleven days were fine and clear.

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Dense smoke, filling the valleys and obscuring the mountain peaks also seriously retards the work of mountain surveys, for a short period every summer. While we were at Beavermouth during the first week in August the thick smoky haze which we first noticed at Bear creek grew rapidly worse, and soon filled the Columbia and Beaver valleys, obscuring the view of the mountains almost without interruption for a fortnight. The smoke came from numerous forest fires up Bush river, Columbia river above Golden and at Albert Canyon. Each year these large forest fires destroy much valuable timber and are a serious menace to the timbering industry as well as to the safety of public and private property. Whether these fires all result from uncontrollable natural phenomena or from wilful negligence on the part of campers and prospectors it is difficult to ascertain; although I am certain of this, that men who have occasion to light fires in a timbered country during the dry season, do not always take proper precautions to see that their fires are completely extinguished; and I know from experience that a small fire which seems black and dead, may still be smouldering in the dry moss and loam, and on the slightest provocation from a friendly breeze may soon develop into a dangerous and destructive forest fire. The Bush Fire Act, while a stringent law, cannot be enforced over such a large territory without the interested co-operation of every man in the province.

Of flora and fauna I shall not speak. The many genera and species of mountain wild flowers which bloom with gay colours in valley and on mountain side are a continual source of pleasure and study to all lovers of nature, to whom I would recommend that excellent compilation 'Mountain Wild Flowers of Canada' by Mrs. Julia Henshaw, a Canadian. Professor Macoun's appendix to Mr. A. O. Wheeler's 'The Selkirk Range' deals exclusively with the mammals, birds, fish, flowers and berries of the Selkirks. And to those who are interested in large game 'Camp-fires in the Canadian Rockies' by Hornady-Phillips will prove most instructive and fascinating. Every day we hear the lament that large game is becoming scarce, nay extinct, in the mountains, but I assure all pessimistic hunters that there is game aplenty yet, if they are not too lazy to go a day's journey from the noisy railway.

I have the honour to be, sir,
Your obedient servant,

P. A. CARSON. *D.L.S.*

APPENDIX No. 18.

REPORT OF R. W. CAUTLEY, *D.L.S.*

SURVEY OF BLOCK OUTLINES IN THE PROVINCE OF ALBERTA.

EDMONTON, ALTA., March 28, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General.
Ottawa.

SIR.—I have the honour to submit the following report of my field operations during the past winter season 1906-07 under instructions of September 27, as amended under further instructions of October 31, 1906.

I commenced outfitting on October 13 at Edmonton, but owing to the state of the local labour market and the great difficulty I experienced in securing suitable horses at a reasonable price it was November 5 before I was finally able to start. The universal prosperity of this district during the past year and the great activity in railroad construction, building, farming and lumbering have resulted in creating an unlimited and therefore, unsatisfied demand for labour and horses, which has raised the wages of one and the price of the other to an unprecedented extent, so that it is

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not remarkable that the men who presented themselves for survey work should have been small in number and not up to the standard of former years. On November 7 there was a great snowstorm and I was obliged to leave the wagons, with which I had started out and proceed on the sleighs, and although the sleighing was very bad for a few days it soon became good and has continued so all winter.

Proceeding north on the Athabaska Landing wagon road, I arrived at the 17th base line on November 13. From November 13 to December 18 the whole party was occupied in cutting a sleigh road from the Athabaska Landing trail at the northeast corner of township 64, range 23, to the point of commencement at the northeast corner of township 64, range 17, west of the 4th meridian, a distance of 36 miles through country covered with heavy windfallen *brulé* or woods. This involved a serious loss of time and was the more disappointing because the country in the immediate vicinity of the Landing trail is partly open and otherwise covered with small poplar and willow through which it is very easy to make a road, but from what I now know of the country I am convinced that it was the most practicable method of procedure.

From December 19 to March 9, 1907, I surveyed the 17th base line through ranges 17 to 27 inclusive, closing on the 5th meridian, and resurveyed 10 miles of meridional section lines in ranges 22 and 23 to connect with work already done.

Having thus completed the work covered by my instructions I started back on March 11 and arriving in Edmonton on March 16, 1907, paid off my party.

There are several scattered settlements in the vicinity of ranges 21 and 22, tributary to the important and growing town of Athabaska Landing, but there yet remains much land that is suitable for settlement and there is no doubt that a large number of settlers will come into this country during the next year or two, particularly as it is served by the best and most heavily travelled wagon road out of Edmonton and Fort Saskatchewan, namely the Athabaska Landing trail. As it is, the people already settled at and near the Landing, seem to be very anxious for further subdivisions in their district and to expect a great advance both in population and development in the near future. Here, as elsewhere, the winter has been the most severe known for years, but there was at no time more than two feet of snow where I was working, which is at least a foot less than there was in Saskatchewan valley; the lowest temperatures recorded in camp were on the 2nd and 4th days of February, when the thermometer reading fell for a few hours below—50°, reaching a minimum of—56° F.

Moose were seen by members of the party on three occasions but being so near to the Landing, and to several small bands of Indians, the country is pretty well hunted and trapped over.

I have the honour to be, sir,
Your obedient servant,

R. W. CAUTLEY, *D.L.S.*

APPENDIX No. 19.

REPORT OF WM. CHRISTIE, *D.L.S.*

RESURVEYS IN EASTERN MANITOBA.

CHESLEY, ONT., February 5, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour, in accordance with my instructions to make the following report on my surveys in eastern Manitoba during the season of 1906.

SESSIONAL PAPER No. 25b

On April 30 I received your instructions dated April 27, by which I was instructed to make a retracement and restoration survey of those portions of townships 17, range 1, township 18, range 2, townships 19, ranges 3, 4 and 5, and townships 20, ranges 3, 4, 5 and 6, all west of the principal meridian, which had not been surveyed by Mr. Bray in 1905.

My instructions provided that I should consult with Mr. Geo. A. Grover, D.L.S., who was engaged on the same kind of work in townships east of those allotted to me, and be guided by any general instructions he might give. It was also provided that my party should consist of a cook and nine labourers, and that my transportation outfit should consist of a buckboard, two wagons and six horses. I was to take the outfit used by Mr. Nash in 1905. My party was to be organized at Winnipeg.

On May 4, I started for the west and proceeded directly to Teulon to consult with Mr. Grover. I arrived in Teulon on May 7, and on the 8th I drove out to see Mr. Grover, and received from him some valuable information regarding the nature of the survey. On May 9, I returned to Winnipeg and spent until the 16th, organizing my party and getting my outfit in readiness. On the 16th, I returned to Teulon, the outfit arriving there on the 17th. On the 19th, I left Teulon with the party for the work. I had decided to begin work in township 19, range 3, west of the principal meridian, since I had only received plans of this township and of township 19, range 4.

The route taken to reach this township was to follow the colonization road, leading from Teulon to Fisher river, as far as the east boundary of section 11, township 18, range 1, west of the principal meridian. From this point a trail leads in a north-westerly direction to Shoal lake and follows around the north shore of the lake. This road was in fairly good condition at the time we passed over it, but there is every indication that during wet weather it would be in a very bad condition. On May 21 we arrived in township 19, range 3, and on the 22nd commenced the survey.

(NOTE.—Description of the townships surveyed have been taken from this report and published as part of Appendix No. 46).

In township 19, range 3, comparatively few of the monuments of the original survey could be found. Such of them as could be found showed that the original survey had been very irregular. Only the outlines of this township were surveyed by Mr. Bray in 1905.

Only the outlines of township 19, range 4 had been resurveyed by Mr. Bray in 1905. In the east half of the township, most of the monuments of the original survey had been lost, while in the west half of the township most of the original monuments were still to be found. The original survey of this township was much less irregular than that of township 19, range 3.

Owing to a mistake in forwarding my mail from Winnipeg, at the time of surveying township 19, range 5, I had not received the plan showing the work previously done in the township. I was indebted to Mr. Grover for a sketch showing the lines surveyed by Mr. Martin, which I found very helpful though not altogether reliable. I was also informed by the settlers that a survey of the marshy land along the shore of lake Manitoba, and a traverse of the shore of the lake had been made during the winter or early spring of 1906. But at many of the section and quarter section corners, on the lines reported to have been surveyed, I failed to find any monuments. I therefore surveyed several of these lines again and established monuments.

In township 20, range 5, most of the meridian section lines and the central chord line had been surveyed by Mr. Bray in 1905. On the lines surveyed by me, I found only two of the monuments of the original survey.

In township 20, range 4, Mr. Bray had resurveyed all the meridian lines, except the north half of the east boundary of the township. He also surveyed eight and one-half miles of the interior chord lines, besides the chord outlines. Most of the monuments of the original survey had been lost.

In township 20, range 3, Mr. Bray had resurveyed the township outlines, with the

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exception of the west boundaries of sections 19, 30 and 31, the central meridional section line and the north boundaries of sections 13, 14 and 15. In this township some large discrepancies occurred between the original and the subsequent surveys.

On November 17, I completed the survey of township 17, range 1, and on the 19th started for Teulon with the outfit. As there was then from two and one-half to three feet of snow on the ground in that vicinity, travelling with wagons was very difficult. On the 20th we arrived in Teulon, and I received your telegram dated November 14, stating that a complete survey was required in township 22, range 4, east, before closing work, and that instructions had been mailed or would be mailed to Teulon. I did not receive the instructions.

As the snow was already so deep in that vicinity, I did not consider it expedient to try to make the survey referred to then, as it would be next to impossible to find old monuments under such a depth of snow. I accordingly telegraphed you for further instructions, and in reply was instructed to close operations and discharge my party, which I proceeded to do.

I stored the outfit with Mr. W. C. McKinnell, of Teulon, into whose charge I also gave the horses to be wintered.

I have the honour to be, sir,
Your obedient servant,

WM. CHRISTIE, *D.L.S.*

APPENDIX No. 20.

REPORT OF W. J. DEANS, *D.L.S.*

SURVEYS AND RESURVEYS IN THE PROVINCES OF MANITOBA AND SASKATCHEWAN.

BRANDON, MAN., February 9, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—I have the honour to submit the following general report of my survey operations during the season of 1906, in the provinces of Manitoba and Saskatchewan.

Having received your instructions of January 11 in reference to subdividing the marsh lands adjoining the shores of lake Manitoba I organized a small survey party at Brandon and left for Oak Point on January 20. On my arrival at Oak Point I interviewed Mr. Reykdal, who was wintering Mr. Edgar Bray's outfit. I got two horses from him, and purchased a sleigh, and on January 25 left Oak Point to commence work in township 19, range 5, west of the principal meridian. In this township I extended lines subdividing all the marsh and land right to the shore of lake Manitoba. The part of the township which I subdivided is a large marsh, separated from the lake by a sandy beach, varying in width from three to five chains. Most of the marsh is covered with water, but there are some few ridges of dry land. There are a number of creeks or channels running through the marsh to the lake; considerable hay is cut on the ridges in the marsh, although it must be a difficult matter to get horses and machinery out to do the work.

In township 19, range 6, west of the principal meridian, I retraced all the lines and extended the eastern boundary south to the lake shore. This fractional township is largely hay land and marsh, although there are a few small areas which would no doubt produce grain. The settlers are largely engaged in cattle raising and dairying.

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In township 18, range 5, west of the principal meridian, I extended the lines through the marsh to the lake shore, thus subdividing the township completely. The westerly part of this township is marsh, except a narrow sandy beach along the shore of lake Manitoba. This beach varies in width from three to five chains, and in places is covered with small poplar and willow. The Oak Point Shooting Club have buildings on section 27 in this township. There are a few ridges and islands of high land throughout the marsh on which hay is cut, but most of the marsh is covered with water, and in numerous places large ponds of water exist. Wild ducks abound throughout the season, and some of the settlers make considerable money shooting them and shipping to Winnipeg. Large quantities of fish are taken from lake Manitoba by the settlers, who find a ready market for them at Oak Point. I was greatly retarded in carrying out this work by cold, stormy weather which prevailed during February.

In township 16, range 4, west of the principal meridian, I retraced some of the lines along the lake shore and ran some which were omitted in the original survey. The sketch furnished me of this township showed the south boundary extending some ten chains farther west than it does at the present time. There either was an error in the original survey or considerable of the beach has been washed away by the lake. St. Laurent, a village located in this township, is quite a thriving place, and in summer time is much patronized by the people of Winnipeg as a summer resort.

On April 23 I received your instructions in reference to retracements and restoration surveys in townships 6 and 7, ranges 28 and 29, west of the principal meridian. I immediately went to Oak Point, took over the balance of Mr. Edgar Bray's outfit, strengthened my party as instructed, and started for Portage la Prairie, in which place I arrived Wednesday, April 25. Here I engaged a car and shipped the outfit to Reston, arriving there on April 27. I intended that my first camp should have been at Reston, but afterwards thought it would be better to move to Sinclair, a point nine miles west. I accordingly moved there and started work. I found most of the horses in my outfit in very poor condition and unable to do the work satisfactorily, but after a week of good care they improved so that I was able to carry on the work and to make good progress. I found a great many of the mounds throughout these townships badly obliterated and in great need of restoration. These four townships are well settled, but I was very much surprised to find that only about ten per cent (10 per cent) of the land is under cultivation. The price of wild lands in these townships varies from ten dollars to fifteen dollars an acre. One settler told me that he paid fourteen dollars an acre for a section of land and paid for it with the proceeds of two crops of wheat. One great drawback for the settlers in these townships is the scarcity of fuel, they being entirely dependent on the railways for the supply, which is brought in from outside points. We had a great deal of rain during May and June, which interfered with the carrying on of the work considerably, but which was of inestimable value to the growing crops. I completed this work on Monday, June 25, and on the 26th started by road for township 27, range 9, west of the second meridian, being unable to get any satisfaction from the Canadian Pacific railway representatives at Sinclair as to when I could procure a car. I arrived at this township on July 4. My instructions were to rectify an error which existed in the survey of this township. I retraced all the lines in the easterly half, and found the east boundary of section 34 to be 14.43 chains short, while the east boundary of the south half of section 3 was 10.70 chains too long. The settler owning the south half of section 3 would not sign a petition to have the survey rectified, so that it was impossible for me to do anything more than retrace the lines and restore the monuments. On July 14, I moved the outfit to Stoughton, a station on the Arcola branch of the Canadian Pacific railway, and procured a car and shipped the outfit to Sinclair, from which place I moved the outfit to township 5, range 29, west of the principal meridian, and started to retrace the lines and restore the monuments in this township and also in township 5, range 28, west of the principal meridian. I completed the work in these townships on August 6, and on the 7th moved camp to township

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9, range 29, west of the principal meridian, where I had instructions to retrace the lines and restore the monuments. I also retraced the lines and restored the monuments in township 8, range 29, west of the principal meridian. On August 24, I moved the camp to township 8, range 28, west of the principal meridian, and retraced the lines and restored the monuments in this township. On September 5, I moved the camp to township 7, range 27, west of the principal meridian, and retraced the lines and restored the monuments there. This latter township is nearly all under cultivation and produces large quantities of wheat of the best quality, which is marketed at Reston, a prosperous town of some three or four hundred inhabitants.

On September 13, I moved the outfit into Reston, and shipped the same by train to Gladstone. My instructions were to subdivide those portions of Big-grass marsh which had dried up in townships 15, 16, 17 and 18, ranges 10 and 11, west of the principal meridian. In order to do this work I moved the camp to section 16, township 15, range 11, west of the principal meridian. After completing as much of the work as possible from this camp, I moved to section 28, township 17, range 11, and after working here for some time I moved the camp to section 5, township 17, range 10. From this camp I completed the work. I found the monuments in townships 17 and 18, range 10, badly obliterated. I would recommend that the rest of the lines in these townships be retraced and the monuments restored.

Big-grass marsh appears to be in much the same condition now as at the time of the original survey, except the southerly and westerly parts, which are now much drier, owing to the drainage work which has been carried out in the southerly part. If the water in Big-grass river, which enters the north end of the marsh, were carried to a proper outlet, a large portion of the marsh would be drained and the lands adjoining advantageously affected. I completed the work for the season on October 25 and paid off the men. On the 27th I stored the outfit and started for Brandon, where I arrived on the 29th.

I have the honour to be, sir,
Your obedient servant,

W. J. DEANS, *D.L.S.*

APPENDIX No. 21.

REPORT OF C. C. FAIRCHILD, *D.L.S.*

SURVEYS IN SOUTHERN ALBERTA.

BRANTFORD, Jan. 28, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to report as follows pursuant to instructions dated April 14, 1906.

I left Brantford on May 7, and proceeded to Calgary where I gathered a party and went on to Banff where I arrived on May 12. I went into camp and began actual operations on May 17, commencing with the unfinished portion of township 26, range 11, west of the fifth meridian.

The first part of the season's work consisted of a subdivision of the coal area around Bankhead, which practically embraced Cascade mountain and the valley of Cascade river to the north and east of the mountain and a part of the range on the north and east of this valley.

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We were considerably hindered by continuous cloudy weather and numerous rainy days, and I was unable to get an astronomical observation until June 20. The interim was spent in retracing and producing the old lines in township 26, range 11, and running new lines in this township and in township 26, range 12. The east boundary of section 14, township 26, range 12, passes a little to the east of the peak of Cascade mountain which is only accessible from the west side.

I spent from June 28 to July 9 moving camp to this accessible side and in attempting to carry this line over the mountain, but was unable to reach it at any point and was forced to give up, but not until after we had scaled the highest peaks in vain efforts to produce the line. The snow was four feet deep in many places and soft and sliding, rendering climbing both difficult and dangerous. On retiring from this effort, I proceeded with the lines on the east and north of the mountain carrying them up in each case as far as possible to the base of an inaccessible cliff, which skirts all the east and northeasterly face of the mountain.

While engaged in this work, I had the misfortune to smash my Watt's transit rendering it practically useless. One of my men who was helping me up the mountain with it fell, and, while he was not seriously injured, the transit was broken by having the main spindle broken, so that the head with the upper plate rolled one way while the tripod and lower plate went with my assistant.

A heavy growth of timber fills the river valley and the lower slopes of the mountain as far north as the north boundary of sections 20 and 21, township 27, range 12. From this point north there is a heavy forest of fire-killed spruce and pine, standing for the most part, but rapidly falling and covering the ground with a tangled mass of logs and limbs. In some places south of the aforementioned boundary of sections 20 and 21, fire has gone through and killed the timber which has fallen, and a new growth of apparently about twenty years has covered these areas. The tangled masses of fallen timber on the sides of the mountains make climbing and running lines extremely slow and difficult. We found little pasture for horses until after passing into the fire-killed section to the north where the grass is very good.

In order to get at the unfinished lines on top of and on the westerly slope of the mountain, I opened a trail from Cascade river southerly along the valley between Cascade and Sawback mountains. The camps along the trail were from one to three miles from the work, but were the most convenient I could get, and necessitated a climb every morning up the side of a mountain covered with fallen timber.

A greater part of the actual work was above the timber line between seven and nine thousand feet above sea level. When I arrived at the southern end of this valley between Cascade and Sawback mountains, I was forced to open a trail over Stony Squaw mountain, or return as I had come in by a thirty mile detour to make two miles. I accordingly opened this trail, and with a little work it would make a much shorter and easier route from Banff to the Panther creek and Red Deer sections of the mountains to the north of Banff.

All of the country surveyed east and northeast of Cascade mountain has been prospected and many seams of coal were seen on which more or less work had been done. On one stream in section 29, township 26, range 11 and section 25, township 26, range 12 fourteen different openings all showing coal were seen.

We had few accidents with the pack train but found it both necessary and difficult to keep shoes on the horses. The dead timber made trail making difficult and was extremely hard on pack sacks and covers. Some of the horses were rather severely snagged but none were permanently injured.

One thing that impressed me, was the scarcity of game in the more outlying parts of our work. More game was seen between Banff and Bankhead and between Banff and Canmore, than in any other part. Evidences of game having been killed were seen and shots were heard while in the Cascade river valley, but the hunters were never seen. I am inclined to think that they were Indians as they did not enter the valley by the trails ordinarily in use by the residents of the district. Cascade river

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valley is an ideal place for deer, sheep and goat but the scarcity might be accounted for to some degree by the fact that we saw both grizzly bear and mountain lion there. I think more thorough protection of the game should be exercised if it is desired to make the Park a breeding ground.

The following other surveys were also made :—

1. John Brewster, lease.
2. Lots at lake Minnewanka.
3. Grandview villa lots.
4. Traverse of Bow and Cascade rivers in township 25, ranges 11 and 12.
5. Correction to survey of east boundary of section 23, township 24, range 8 and retracement of the south boundary of the Indian reserve across the same township.
6. N. K. Luxton, lease of villa lot.
7. Resurvey of various villa lots in Banff.

In making the traverse of Fortymile creek for the John Brewster lease, two days were spent in looking for an old post or monument on the north boundary of the old park without success, but after the snow had disappeared a post was found burnt off. This country has all been burnt over since the old survey. I found no mound in retracing 119 chains of this line southwesterly from the creek, although such are shown in the old notes and plan.

In the traverse of Bow river we found the Canadian Pacific railway employees building a dam near the middle line of township 25, range 11 to deviate the river through a canal, which they have constructed. This deviation will do away with two bridges on the railway line, if the river can be made to take and hold the new channel. These improvements are noted in the traverse. As the river was partially frozen but not sufficiently so for us to cross on the ice, we were handicapped to a certain extent in the traverse work. I completed all the work for which I had instructions on Saturday, November 24, disposed of my outfit on the 26th and left for home on the same night, and arrived in Brantford on December 1.

I have the honour to be, sir,
Your obedient servant,

C. C. FAIRCHILD, *D.L.S.*

APPENDIX No. 22.

REPORT OF LOUIS E. FONTAINE, *D.L.S.*.

SURVEYS AND RESURVEYS IN CENTRAL ALBERTA, INSPECTION OF CONTRACTS IN CENTRAL AND SOUTHERN ALBERTA.

LÉVIS, QUE., January 28, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR.—I have the honour to submit the following general report concerning my survey operations in Alberta during the past season, under instructions from you dated April 19, together with subsequent instructions of June 15 and September 29.

I left Lévis on April 24 and proceeded to Edmonton, Alberta, where I was to organize my party. For a few days following my arrival I was engaged in collecting transport outfit, overhauling the same, engaging men, ordering supplies and completing the organization. By this time the spring rains had set in, thereby making the

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roads soft and miry; and as most of the horses were fresh off the range, I was obliged to postpone my departure. Eventually, conditions being favourable, I left Edmonton and proceeded by way of Sprucegrove, Stonyplain and Mewassin, and from there to the northwest quarter of section 31, township 50, range 3, west of the fifth meridian, where I was to begin the restoration survey in the said township and range.

In proceeding with the work, I must say that the lines previously run were so obliterated that all attempts to follow them throughout proved futile. The only vestiges being in the islets of green timber spared by the lumbering operations and fire. The charred or rotten remains of posts were generally buried under a thick accumulation of hay, leaves, wood and moss.

While operating in this township, I must say that Mr. Bruin gave us great attention. His first move was to totally destroy a cache of supplies, and following his clue handled my transit very roughly, during our temporary absence from the line. However, as I had an ample supply of provisions stored at a farm house on the north side of Saskatchewan river, and also a second transit, the inconvenience and loss of time resulting thereby amounted to only two days.

A detailed report as to the general resources of this township will be found in the official field-book.

My next move was to proceed to Edmonton, where I made a stay of two days for necessary repairs to the transport outfit, and the ordering of supplies; thence left to carry out operations as instructed by your letter of June 15.

These operations were of a varied character and consisted mainly in the taking of observations, investigating the marking of certain boundary corners and completing the traverse of certain lakes. As this was done in no less than fourteen townships, I think it would be superfluous to enumerate each of them here, as the returns show fully what was performed in each case.

In order to achieve the purpose in view, I had occasion to cross this section of the province of Alberta, comprised between the fourth and fifth meridians, and townships 37 to 52.

While performing this journey, I may state that it was hardly conceivable what great changes had taken place in this district since my first visit in 1898. Then a farm-house or a ranch would be found only every thirty or forty miles, whilst at the present time you are never without sight of the one or the other. Moreover, in several townships, not a quarter section is to be had for settlement and instead of what was formerly a vast wilderness, beautiful fields of waving grain are to be seen in all directions. Settlers are continually coming into this very fertile district, and day after day they are to be met with on the main trails making their way to their new homes, with wagon loads of their implements and effects.

Access is very easy to this district and it is traversed in several directions by a number of good main trails, and ere long it will have good transportation facilities by rail. Two of the grading outfits of the Grand Trunk Pacific were met, one in township 43, range 1, and the other in township 44, range 6, both west of the fourth meridian. On the other hand, trial location lines for the extension of the Lacombe branch of the Canadian Pacific railway, are staked in townships 38, ranges 7 and 8, west of the fourth meridian. The same company is also engaged in building an extension bridge across Battle river, at Hardisty, and it was proposed to complete the grading on the east side of said river to a distance of fifteen miles before fall.

In this section, fresh water is to be had in almost all lakes and sloughs. In boring wells, good water is obtained at almost any place at a depth varying from ten to forty feet.

During the course of last season, a vast area in this section was devastated by prairie fires, thereby causing more or less damage to farmers and stockmen. On two occasions, during the night, I had to waken up the whole crew and set it to work burning fire guards around the camp premises, and I may say that if these precau-

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tions had not been taken in the proper time, the whole of the transport and camping material would have been destroyed.

Wood for fuel, although in limited quantities, is obtainable in the ravines of most of the creeks emptying into Battle river. On the other hand, good coal veins are to be found in several places; some of them are being operated by private capital and the output from the same, at present, is sufficient to supply the local demand.

Having given a brief description of the territory traversed while carrying on operations called for by the second portion of your instructions, I will now resume the general trend of my report.

On October 5, I left Lavoy, one of the distributing centres of the Vermilion district, situated eighty miles east of Edmonton, on the main line of the Canadian Northern railway, and proceeded to Sullivan lake, where I was to begin the examination of survey contract No. 22.

In these townships adjacent to the lake, I carried on the operations called for and then went to Red Deer river, where three townships forming part of the same contract were to be subdivided. On my arrival, I learned that the contractor had left after subdividing township 28, range 18. Accordingly I examined the said township and then proceeded to Chin coulée, by way of Gleichen and Lethbridge, to examine contract No. 5. The necessary operations were duly carried on, and on their completion, I left for Calgary.

On my arrival there, the season being so advanced, and the horses so fagged by so much moving that I decided to cease operations for the season. I therefore made arrangements for the wintering of the horses and transport outfit. I then left for Edmonton, and there discharged the party on December 12.

After providing for the storing of part of the transport outfit left here in August, I left for home, where I arrived on December 23.

I have the honour to be, sir,
Your obedient servant,

LOUIS E. FONTAINE, D.L.S.

APPENDIX No. 23.

REPORT OF GEORGE A. GROVER, D.L.S.

RESURVEYS IN MANITOBA, INSPECTION OF CONTRACTS IN EASTERN MANITOBA.

KINGSTON, ONT., January 28, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR.—I have the honour to submit the following report upon my survey operations for your department during the past season.

Under your instructions dated April 12, 1906, I left home on April 23, and arrived in Winnipeg on the 25th.

Winnipeg, as usual, was full of activity, and the hotels were crowded. It is a wonderful market both for men and supplies, there being plenty of work, and plenty of men and the stores carry stocks of goods that twice the population would scarcely warrant in the east. I spent a couple of days there getting supplies and engaging my party and then proceeded to Teulon to pick up my outfit, which I had stored there at the close of the previous season.

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For some years past Teulon has been the 'end of steel' on the Stonewall branch of the Canadian Pacific railway, but this year they were extending the line farther north, purposing, I believe, eventually to run to Icelandic river, on lake Winnipeg. This should prove a profitable line, for though the country is at present largely broken by marshes and swamps, these should gradually diminish with deforestation, and the soil in nearly all parts is excellent.

I do not fancy that this country will be a great wheat growing one, at least for many years to come, but it would seem to be well adapted to mixed farming and dairying. For the poor man a wooded country is preferable to the prairie, as he has building material and fuel at his door and can make his home for his labour. The proximity to the great and rapidly growing market of Winnipeg will also assure the settler of a demand for his products and guarantee him his necessities at fairly reasonable prices.

The Canadian Northern railway is also extending, or talking of extending, its line along the shores of lake Manitoba from Oak Point. This should also prove a valuable extension but there is a wide stretch between the two lakes (Winnipeg and Manitoba) that neither road seems desirous of entering, why, I do not know unless for economic reasons of their own. It is a fertile country and fairly well settled, particularly when its distance from the railway and the difficulty of road travel are considered. Moreover this should be a cheap country to build a road through, there being no great engineering difficulties to overcome. Transportation is the question of the hour from London's most crowded boroughs to the sparsely settled portion of our great West.

In this country moose, elk, deer and other large and small game as well as wild fowl and ducks are plentiful. In the fall the woods are infested with hunters and, owing to the vague ideas which some of them have of the appearance of game, they lend a spice of excitement if not of actual danger to our work.

This country to the north of Teulon is quite a characteristic sample of the West and conveys a good idea of the heterogeneous nature of our immigrants. Here one finds all classes and conditions of men jostling elbows. Norwegians, Swedes and Finns from northern Europe living as neighbours to the French, Galicians and Spaniards from the southern half of the continent and the whole leavened by Americans, English and Canadians (both French and English speaking), not settled in separate colonies but all the different races side by side. This commingling of races, while very interesting from an ethnological view point, causes some real difficulties in practical government. Very seldom do a man and his immediate neighbour speak the same tongue and though they may have a knowledge of English it is in most cases not a very intimate one and it is almost impossible to avoid constant bickerings that are quite unnecessary. Each race has an inborn distrust of the others which nothing will entirely overcome. Add to this the difficulty any man finds in expressing himself adequately in any but his mother tongue and the consequent misunderstandings afford a difficult proposition indeed. The wonder is not that the immigration and other officials have difficulties but rather that they have been able to cope with them so successfully on the whole. We can only hope that the next generation or, if not, at least the third will gradually forget their old world jealousies and mistrusts and grow to understand that we are all Canadians with a common future no matter what our past may have been.

I spent a day or two in Teulon getting my outfit overhauled and my stores collected and proceeded north into my first work where I arrived on the 3rd day of May and on the following day started my season's work in township 19, range 1, west of the principal meridian. This township, though stony in places, has excellent soil and one settler stated that he had grown fifty bushels of onions on a patch about fifty feet square. He assured me that all kinds of vegetables and grain do remarkably

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well here. There are two or three large marshes in this township which supply hay and water for the cattle.

Township 20, range 1, west of the principal meridian, was the next visited, and it is very similar to its neighbour to the south, with the exception that no considerable marshes are met with.

In township 20, range 2, west of the principal meridian, there seemed to be less stone, but the marshes were large and deep.

Township 19, range 2, west of the principal meridian, is similar to its northerly neighbour, but there is less stone and less marsh land.

Township 18, range 1, west of the principal meridian, has perhaps more stone than any of the other townships visited in the vicinity, but practically all the homesteads are occupied, and the settlers seem to be able to easily clear their land.

In township 18, range 1, east of the principal meridian, the settlers are not so far advanced owing to the lack of roads and the rather heavier bush, but the soil is good, and I think a few years will witness quite an improvement.

In all these townships, I had the previous year retraced Mr. Martin's lines, and this year was making the re-subdivision complete, rendered necessary by the gross errors in the original survey, the great discrepancies between it and Mr. Martin's resurvey, and the fact that all the old posts were lost. Many of the settlers expressed their appreciation of the work, and I hope it may help to a more peaceful understanding among the various people, although I think some of them would hardly be satisfied unless the government carefully fenced their land and gave it to them.

The settlers in all these townships seem to be getting along nicely, and in township 18, range 1, west of the principal meridian, there are some very good farms and a nice little school has been built recently. Although they are a long way from the railway, one settler has a threshing machine, and there is considerable grain grown. Most of the settlers, however, have so far contented themselves with clearing their land, putting up buildings and attending to a garden and a few cattle, which latter represent their savings when they hire out, as most of them do, for part of the year.

The timber in this country makes good fuel and temporary buildings, being mostly poplar, though there is a little spruce in some places. A good deal of poplar is cut and shipped into Winnipeg as cordwood.

In several places we saw outcrops of limestone of a creamy colour, which was said to make first-class lime, and from all appearances would make a good building stone if it could be marketed.

In the rush west this country seems to have been overlooked, but I think from now on there should be continuous, even if somewhat slow, progress.

On July 10, I started from township 18, range 1, west of the principal meridian, to move into township 22, range 7, west of the principal meridian. We went by way of the trail around the head of Shoal lake to Oak Point, and thence by the Colonization road to Scotch bay, and from there used settlers' and Indian trails, none of which were very good.

We had a peculiar season, in that the spring was remarkably dry, and heavy rains did not commence until late in June and continued well into July. This spoiled the roads just at the time we wanted to use them, but in one way was a blessing, for the mosquito crop was unusually light.

Along the shores of Shoal lake and between that and lake Manitoba is a fine pastoral country composed of great hay meadows or flats, with just enough bush to shelter the stock, and most of the settlers were engaged in cattle raising and dairying.

Oak Point is situated in a park-like piece of country, with oak clumps and prairie alternating, and facing on lake Manitoba. For natural beauty it would be difficult to surpass, and I believe man is to do his part and will soon turn it into a beautiful summer resort.

This country has been settled for some time, and I met several farmers who had started with nothing and now own well stocked farms of from one hundred and sixty to four hundred and eighty acres, cattle forming a large part of their assets.

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Cream is shipped from here to Winnipeg in large quantities, which will doubtless increase when better facilities for handling are provided.

Travelling north the country gradually becomes less open and the bush changes to the familiar poplar once more. The trails get gradually worse as the limits of settlement are reached, though I must confess I saw them at their worst, which means well nigh impassable.

Reaching township 22, range 7, west of the principal meridian, on July 14, I found that only two or three families were in actual residence—the others awaiting the resurvey to get accurately located. An examination of the south boundary of the township showed that I must be prepared for very unusual work, and I was therefore not surprised at the condition in which I found the interior lines.

I ran a trial line the full six miles across the south of the township to give myself a base from which to work, and from it I laid out my meridians to join the section corners on the south outline with those on the north as closely as possible. It was impossible to correct the old survey without interfering with the adjoining townships, and I consequently was forced to modify my work by the old corners when I found them. This gave most peculiar results, as my technical returns show, but I left good monuments on the ground, and gave correct chainages and azimuth between them, which was about the best I could do.

This township, township 22, range 7, west of the principal meridian, is well suited for mixed farming and dairying, the soil being a rich black loam with clay subsoil. The surface of the country is gently rolling and is well timbered with poplar, some of good size, on the ridges and interspersed with hay meadows in the depressions. This alternation extending as it does through the township gives plenty of building material and fuel and good feed for stock. Game was fairly plentiful and some of the settlers catch a good many fish in lake Manitoba.

From township 22, range 7, I proceeded, in consequence of your instructions, into township 22, range 8, west of the principal meridian, the east outline of which had been re-run in connection with the resurvey of the former township. To get into township 22, range 8, we passed through the Sou Sonse Indian reserve, which is a very pretty piece of country along a fine sandy beach on lake Manitoba. The road along the shore is picturesque and park-like in the extreme and the adjoining land raises hay in abundance though the Indians seem to disdain the cultivation of any of it. They keep a few cattle and live chiefly by fishing and hunting. I fancy that with the advance of civilization they will want to move farther back, which would open a nice piece of country to settlement.

Township 22, range 8, is largely broken into by this reserve and, as I had no instructions to re-run the reserve boundaries and the old lines were lost I judged it best to keep at a safe distance from it. At the same time I placed sufficient corners to guide the settlers in their choice and closed all my surveys. From here I proceeded, as the season was well advanced, to the inspection of certain contracts of 1906 in accordance with your instructions.

I made my first inspection in townships 23 and 24, range 7, west of the principal meridian, being part of contract No. 6 of 1906, held by Mr. J. L. R. Parsons.

To change from re-tracing old lines run twenty years ago to inspecting present day contract work is, I fear, not in the interest of rigid inspections. There has been such an improvement, not in any particular, but in every detail of the surveys made in this country in the past twenty years that one would hesitate to speak of them as being the same class of work. In no way could the advantage of the numerous changes in the manual and in the field instruments used, be more markedly illustrated than by this change which I was forced to make this season.

The lines examined in contracts of 1906 were straight, the chainage good and the corners were well marked, none of which could be said, as a rule, of the more ancient surveys in this country. I had, I may say, one pleasant surprise during the summer when I re-ran a meridian outline, run thirty years ago, and checked almost precisely

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both in azimuth and chainage but this stood out as a brilliant exception to the rest of those surveys.

On the contrary I found the surveys of to-day very satisfactory in every case; the clause regarding opening and blazing of lines was not always interpreted according to my ideas but in all other respects I thought the work was generally creditable both to the contractors and to the department and I cannot conceive that any such surveys as I have been retracing could be passed so long as the present system is enforced with intelligence and honesty.

From township 23, range 7, west of the principal meridian I proceeded south via Oak Point, Stonewall, Winnipeg and Ste. Anne to my inspections in southeastern Manitoba. When passing through Winnipeg I dismissed three of my party, reducing its strength to six, exclusive of the cook and myself, which I found ample for inspection purposes.

The roads were by this time in good condition and I had no difficulty in moving, but the carts which I was using did not allow great speed. I have used these carts now for two seasons and, though they have merits, I think on the whole wagons are preferable and they are much more readily replaced.

In travelling from Oak Point to Ste. Anne I rested over Sunday on the southwest shore of Shoal lake and, calling on one of the settlers in the afternoon, I was surprised to note quite a pan full of salite or crystalized salt which he informed me had been deposited in his kettle through evaporation of water. His well was only a few feet deep and I was led to wonder if valuable salt solutions might not be found at greater depth. The settler himself was unaware of the nature of the mineral until, at my suggestion, he tested it. He had not noticed any salty flavour to his drinking water but to me it was quite perceptible. His house was on a rather sandy ridge quite close to the shore of the lake.

From Ste. Anne I proceeded along the Dawson road to the contracts reached by it. The road itself I found in good shape there having been considerable grading done on it and the small bridges being kept up by the farmers. The piers of the old bridge on Whitemouth river are still visible but are in a ruined state, the superstructure having disappeared. However, at the time I reached it the river was not difficult to cross there being good bottom with water not over three feet deep and the approaches were not too steep. Sportsmen are the chief inhabitants of this country though there are a few settlers and an occasional lumber camp.

After inspecting contracts Nos. 6 and 4, I moved south through contract No. 10, inspecting it on my way to Woodridge, and from there went by the trail running almost due east into contract No. 3. I inspected this contract and continued south on the west side of Whitemouth lake, through Vassar and Pine Valley into townships 1 and 2, ranges 10 and 11, east of the principal meridian, being part of contract No. 7.

Whitemouth lake is a fine open piece of water, with a fringe of hay meadow or marsh along the shore. At the time I was in the vicinity there were great numbers of wild geese on the lake, but it was difficult to get close enough to kill them.

Vassar is only a station, but there is some settlement in the neighbourhood.

Pine Valley is the name given to a small settlement adjoining Piney station on the new Canadian Northern extension from Emerson to Sprague, nearly parallel to the international boundary, known as the Ridgeville branch. This branch has been in operation only for a short time. At Pine Valley I met several contented and prosperous settlers, doing well in a country that a few years ago was principally swamp. This place seems to be settling up rapidly, and there seems to be some good land in the vicinity.

The difficulty in southeastern Manitoba is to distinguish the good land from the bad, so much of it being covered by moss and swamp, under which the soil may be good or may be very sandy, as it is in many places.

While we were camped in township 1, range 10, east of the principal meridian, the big blizzard of November 16 caught us. Fortunately we were camped in a sheltered

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spot, but I was forced to buy hay for my horses, as the feed was very meagre before the storm and, with five feet of snow, it was almost impossible for them to get anything.

I had previously thought of storing my outfit in Pine Valley, and this storm quite decided me to do so, as it was ridiculous to think of starting on a long move through the snow with carts. I therefore stored my outfit in Pine Valley and took train for Winnipeg, where I discharged most of my party, retaining only my cook and two other men to finish the season.

For the inspection of scattered contracts a small party, with the use of railway and hired transport, is expeditious and, I think, economical for the department, but not for the surveyor paid by allowances.

I then proceeded by train to Makinak, purposing to inspect contract No. 9, but on my arrival I learned that the contractor, Mr. Dumais, had left the work early in the summer on account of water, after doing very little work, and had not returned. I therefore thought it would be a waste of time to go farther, so I took the next train to Grandview, where I hired a team and drove out to the inspection of contract No. 5.

We were engaged on this work while the weather was quite severe, and I was surprised to see the threshers working outdoors with the thermometer about 30° below zero and a couple of feet of snow on the ground.

The land in this vicinity is, however, excellent, and this year between heavy crops and additional acreage the threshers were quite unequal to the demand, and consequently had to make a long season of it.

This country is well settled right up to the borders of the timber reserves, and the settlers seem to be doing well. They are largely Canadian, English and American, and are very progressive, Grandview being quite a good sized town with every appearance of prosperity.

After completing the inspection of contract No. 5 I returned to Winnipeg and proceeded to Lac du Bonnet to the inspection of contract No. 8. Finishing this, I returned to Winnipeg, discharged the remainder of my party and took train for the east, arriving home on December 24.

I have the honour to be, sir,
Your obedient servant,

GEO. A. GROVER, *D.L.S.*

APPENDIX No. 24.

REPORT OF A. H. HAWKINS, *D.L.S.*

SURVEYS AND RESURVEYS IN SOUTHERN SASKATCHEWAN AND SOUTHERN ALBERTA.

LISTOWEL, February 26, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour in accordance with my instructions, to submit the following general report on surveys performed by me, during the season June to December, 1906.

Upon receipt of your instructions dated May 15, 1906, I began at once to prepare for the season's work, by opening correspondence with your department, relative to securing instruments that would enable me to perform the work with the greatest degree of accuracy possible. Upon receipt of my sidereal time piece, I left my home

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in Listowel on June 7, en route to Medicine Hat, via Owen Sound and Canadian Pacific Railway steamer *Athabaska* for Fort William, and from thence by rail to my destination, where I arrived June 11. I at once set to work to secure the necessary outfit, in which work I was materially assisted by Mr. F. G. Foster, mayor of Medicine Hat, and Mr. L. B. Cochrane, government agent.

The work of organization was somewhat slow, as there was no horse market in this place, and every person owning animals seemed anxious to dispose of them, at what appeared to me fancy prices, but after a thorough canvass of the material offered, I selected three teams, that I thought would be what was required, and which proved an excellent lot for the purpose. The other parts of my outfit were more easily secured. Plenty of men offered themselves as labourers, but careful selection is very necessary. A cook, however, seemed impossible, and I did not get as good a man during the whole season, as the wages offered should have secured.

On June 21, we started for our first work, being the subdivision of township 2, range 29, west of the 3rd meridian. We travelled south along the valley of Bullshead creek, intending to cross Cypress hills, via the Royal Northwest Mounted Police post lodge, but at 2.30 p.m., a rain storm started in, that turned the trails to streams of mud, and we camped in a settler's vacant cabin, where we remained until the morning of the 23rd. The trails were very soft, so that I put four horses on my heaviest wagon, and trailed the buckboard. Several bridges had been washed out, and the trails were very heavy, so that our progress was slow. The rapid settlement, and consequent fencing of old and opening of new trails delayed us somewhat, but we arrived at our destination on the evening of the 26th and camped on Middle creek in a pasture owned by Mr. E. Peachy, who kindly gave his permission.

The country in the vicinity of Cypress hills is fairly well settled, and considerable attention to mixed farming seems to be the rule. South of the hills, however, settlers are much more scattered, and cattle or horse raising seems to be the more profitable and popular employment, and the soil seems to change in character. South of the hills is a heavy clay, with considerable stone, while the immediate vicinity of the hills is more of a loamy nature.

Township 2, range 29, west of the third meridian, is a rolling prairie, traversed its entire length by Middle creek, and across its southwestern portion by Lodge creek. The soil is generally third and fourth class, and is a hard clay with numerous very stony patches, except the valleys which are comparatively narrow, where it is a clay or sandy loam, easily cultivated and very fertile but subject to inundation during the spring, as these streams, as is the case with all prairie streams, rise and fall with great rapidity.

There are three settlers in this township, Mr. Peachy in the north, Mr. M. Lynch in the centre and Mr. D. A. Hammond in the southern portion of the township. Mr. Peachy has a very fine band of Percheron horses, numbering some 80 head, as well as some 200 cattle. Mr. Lynch and Mr. Hammond have each about 250 head of cattle, and all doing well. All three of these gentlemen are working on irrigation schemes, their object being to cultivate as much of the bottom land as possible, in order to raise feed for the more efficient wintering of their growing herds, and which I have no doubt will add very materially to their prosperity and to the value of their holdings.

There are several other very desirable locations along these valleys for small ranchers, and I am informed that there are some very excellent and prosperous locations on Middle creek, to the north of this township.

All of these settlers, and Sergeant Allan of the Royal Northwest Mounted Police testified as to the excellent garden produce raised in the valleys, so that I am quite sure, that cultivation only is needed to raise what hay, grain or vegetables are required.

There is no timber in this township, a few bunches of willows, from 1 to 2 inches in diameter, being all we found, but timber may be obtained for fuel or for building purposes in Cypress hills and at present a sawmill is in operation there, and distant from 40 to 50 miles from the township.

Coal may be obtained at a place some 10 miles south of this township, in the state

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of Montana, where the settlers dig out what they require. It is easily accessible, and appears to be sufficient in quantity, and a fairly good lignite, containing however considerable sulphur.

The grass on the uplands is nearly all blue-joint, and appears to be very nutritious, but rather short, indeed that cut for hay in this vicinity would average only from four to six inches in length.

Fairly good trails lead from Medicine Hat and Maple Creek to this locality, and a good trail leads from Havre, a station on the Great Northern railway, which is some thirty miles to the south.

Upon the completion of this township we crossed Lodge creek and started westward for our next work in township 1, range 8, west of the fourth meridian passing en route some of the finest hay lands seen by the writer during the season. These lands lie along both sides of Sage creek, and were covered with a heavy growth of blue-joint and pea-vine, eight to ten inches high at the time of my visit, and very luxuriant.

This country is all a rolling prairie, the land, however, apparently improving in quality as you proceed westward.

As Milk river is approached, the surface becomes more rolling and rugged, and broken by small coulées leading into Lost river (which flows into Pakowki lake) and into Milk river. The retracement of the east boundaries of townships 1, 2, 3 and 4, range 9, and the survey of the east boundary of township 1, range 8, now engaged our attention. I regret to have to report that I found a want of care characterizing a large portion of this work. For example, the post marking the southeast corner of section 1, township 3, range 9, on the north side of the correction line, was on the south side of the road allowance, and marked for section 36, and the existing monuments do not appear to be in line. The trails at this season of the year are all in first-class condition, and there is apparently considerable traffic.

This appears to be the heart of the ranching or cattle raising country, and large herds were frequently met, both in the valley and on the uplands, and the headquarters of the Spencer Brothers, Pruitt, and Milk River Cattle company, are in the immediate vicinity, besides a large number of smaller concerns along Milk river.

The Pend d'Oreille police post is also located in the valley of Milk river, in township 2, range 8. Many deep coulées, extending both to the north and south of the river, cut the townships, giving the surface a somewhat rugged appearance, but affording most excellent shelter for cattle and horses during the winter.

Pend d'Oreille coulée, extending from Milk river to Lake Pakowki, is perhaps worthy of special comment. Apparently during very high water in the lake the outlet is this coulée. It averages one-half mile wide, and the soil is apparently a very fertile clay loam, as at the time of my visit it was producing a most luxuriant crop of blue-joint, and was, of course, a great rendezvous for thousands of cattle, and no doubt within a short time will be brought under cultivation.

Rattlesnakes were found in townships 1, 2 and 3, range 8, where we killed no fewer than half a dozen, one of them measuring five feet in length, and, strange to say, no trace of them was found elsewhere.

The best way to get into this country is by trail from Coutts, a station on the Alberta Railway and Irrigation Company's railway, or from Selby, a station on the Great Northern railway, in the state of Montana. From either place good trails lead to all parts of this country.

There is some wood to be had for fuel in the various valleys, but coal is the chief fuel, and apparently abounds throughout the entire country. Seams that have been disintegrated by weather and frost were observed in nearly all of the deeper coulées, and in one on the west boundary of township 1, range 8, where the earth and other foreign matter had been cleared to some extent, we were able to help ourselves to what fuel we required. It appears to be of the lignite variety, and is largely impregnated with sulphur.

Sandstone is abundant in the coulées on the south side of the river, and in many cases is quite hard enough to be used as building material.

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The country along the south boundaries of townships 1, ranges 8, 9, 10 and 11, is very rolling and rough, being crossed by spurs and coulées from Sweetgrass hills. The coulées were nearly all dry at the time of my visit, but springs yielding very excellent water were found on several occasions. A number of settlers are located on these coulées and cultivate the bottom lands with fair success, but general farming without irrigation appears to be out of the question.

Besides resurveying the south boundaries of townships 1, ranges 12 and 13, there was considerable retracing on each of them, so much so, that in accordance with your further instructions, I made a resurvey of township 1, range 13. The original subdivision surveys in these townships appear to have been rather carelessly performed, as lines were not straight, distances not as shown, and several monuments noted had never been constructed at all. Probably it would have been better had the resurvey been extended to township 1, range 12. The south boundaries of townships 1, ranges 8, 9, 10, 11, 12, 13 and 14, were all more or less out of position, indicating great want of care, and all the township corner posts planted in this survey were wrongly marked. Township 1, range 14, is not so rolling as the other ranges, but otherwise similar conditions obtain. This whole country, in the writer's opinion, is admirably suited to cattle raising, and is but very indifferent farming land, judging from the poor crops produced in township 1, range 13, and in three different places, where cultivation was tried on the uplands.

Milk river flows through the northeast of township 1, range 13, and waters the northern portion of township 1, range 12, thus providing water for the numerous herds of cattle to be found in this locality. Wood for fuel may be obtained in places, and with a little development work coal could be mined, as indications were seen in several coulées in this neighbourhood pointing to the fact that a bountiful supply was near at hand.

There is a great abundance of sandstone in townships 1, ranges 12 and 13, and especially in the vicinity of 'Writing-on-Stone' Royal Northwest Mounted Police post. The softer parts have been removed by erosion, leaving the rock in all sorts and conditions of pleasing and fantastic shapes, forming a very beautiful and picturesque sight. The sandstone is easily quarried, and is an excellent and abundant building material. All of the settlers with which the valley is dotted use it to a greater or less extent in their building operations for cellars, foundations and outbuildings.

Leaving Milk river, we proceeded west, to the Alberta Railway and Irrigation Co's railway, and thence northwesterly along the road to Brunton station. The country as far as the ridges is similar to that already described. After crossing the Milk river ridges, which lie from four to six miles south of Brunton, the land appears to improve in quality as witnessed by the more luxuriant growth of grass, and some excellent crops raised in the vicinity of Brunton.

From Brunton we proceeded north to Etzikom coulée, where we camped, in order to retrace certain lines in townships 6 and 7, range 17. The subdivision of these townships appears to have been done in a very indifferent manner, as shown by the notes returned of the retracements made, and I am of the opinion that the entire township would have to be retraced, to eliminate the errors. If I might be allowed, I would suggest the very great desirability of a resurvey in these two townships, as nearly every line retraced was found to be different to the returns sent in, both in chaining and azimuth.

These two townships are generally good soil, and I think will very shortly be cultivated, and form an important addition to the producing lands in this district.

Several claims have been located, but only a small amount of land, as yet, has been cultivated, but probably during 1907, the amount will be very largely increased. Coal is the only fuel. It is to be had at Stirling, a station on the Alberta Railway and Irrigation Co's line, and ten to fourteen miles distant over the very good trail following the Etzikom coulée, although one settler informed me that he knew of a seam of lignite in township 6, range 16.

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Our next work was to make an examination of the third correction line, ranges 22 to 26, and we passed through Stirling and Lethbridge en route. Stirling is the centre of a new Mormon settlement, and appears to be in a thriving condition. Here all men are brothers. From what I could learn, the settlement extending westward from this point, is in a prosperous condition, and I am credibly informed, they as good Mormons will help one another in all possible ways.

A large beet-root sugar factory at Raymond, some six miles west of Stirling, has opened up a large industry, that men, women and children of this settlement all assist in making a success.

Irrigation schemes are being pushed in all directions, and the excellent produce of all kinds, testifies to the fertility of the soil when properly watered. As you near Lethbridge, several large irrigation canals are passed, and the country assumes a still more settled aspect. Good buildings, larger stacks of grain, and more fences mark the advance of civilization.

We spent one day in Lethbridge, replenishing our provisions, horse food and fuel, and shoeing our horses, and attending to several minor repairs, and making a short call on the agent, Mr. Martin. We then started for the third correction line, and here again we found somewhat careless methods of surveying very much in evidence, and the positive instructions given in the Manual to make the line joining township corners a true line, evidently disregarded, as the line joining the monuments, on several occasions, was anything but straight.

The road allowance in one place was but fifty links in width, and was corrected and widened, as much as circumstances would permit. Only a few of the original posts were found standing along these lines, and I was informed that the same conditions existed throughout the adjoining townships. Partially obliterated pits, sometimes quite difficult to find, were generally the landseeker's only guide, causing him at times much trouble to ascertain his location.

An error of ten chains was found in the east boundary of sections 6 and 7, township 11, range 22. As no lands were patented, and the only improvements affected were plowed land and some fencing, the latter of which in any case would have to be renewed in the course of two or three years, and as the settlers would neither consent nor refuse to have the change made, I dug pits on the east boundary of these sections, in the proper positions. It appeared to me to be too bad to leave so glaring an error which might cause costly and useless litigation in the future when correction could now be so easily made.

The country along this third correction line, is fast settling up, and will in a very short time become a factor in the wheat producing districts. The soil is a clay loam, and apparently very fertile. The land has been taken up within the past three years, and even in so short a time many fine farm buildings and houses were noticed, and one hundred acre fields were seen quite often, all testifying to the productiveness and fertility of the soil. Very few quarters of available land were vacant, and all held their lands at from \$17 to \$25 per acre, when for sale at all.

Fuel is an item in the domestic economy of settlers in this region that presents a very serious obstacle. During the time of my visit in the early part of November, on several occasions I heard settlers pleading with the coal dealers in Leavings and Claresholm to let them have a little coal, and although there is an abundance in the neighbourhood, the settlers seemed unable to get it. The Black Diamond mine, east of Lethbridge, had contracts for all they could produce, and the strike at Lethbridge and a broken cylinder head prevented them from producing the usual supply. Indications of coal were observed in section 7, township 11, range 22, where a well had been sunk some twenty-seven feet, and shale having the appearance of close proximity to coal was found. Also on Rocky coulée, running north and south through township 10, range 24, some prospecting had been done, but not sufficient to strike a good seam. I was informed that about two miles north of the correction line in township 11, range 22, coal had been dug, where it was exposed very near the surface. It seems a great pity that settlers should be at the mercy of coal companies and strikes, when so much

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material is so near at hand. The development of this coal would remove a great obstacle to the complete and very prosperous settlement of this splendid tract. All the settlers we met seemed to be hopeful and prosperous. One young Englishman who had been on his claim two years, and started with nothing, had some eight hundred bushels of wheat, besides two hundred or more bushels of oats. He was living in a small shack, but felt that he was on the highway to prosperity, and the same air and spirit was noticeable all through the locality.

The road along the third correction line leads directly into Leavings, a station on the Calgary and Edmonton branch of the Canadian Pacific railway and during the time of my stay, from five to ten wagons per day, loaded with grain, passed us on their way to market. Hay was purchased from the settlers in this locality, as our horses had to be tied up, owing to a large portion of the country being fenced. What remained was eaten very closely by the cattle which are allowed to range on vacant lands. The hay was of good quality, timothy and red top, and appeared to grow luxuriantly, and the farmers in this locality would, I think, have but little difficulty in feeding their animals during the winter.

Potatoes, turnips, carrots and beets are grown all over the district, and from samples obtained appeared to be of excellent quality, and I was informed that the crops were easily raised and abundant.

The want of water is somewhat of a drawback, but most of the settlers now have their own wells that range in depth from fifteen to two hundred feet, and while some appeared to be tainted by the proximity of coal, the water is generally very good although hard.

Some complaint was heard as to the market not being so satisfactory as desired. When wheat was 52 to 54 cents per bushel in Leavings the same grade was selling for 70 to 75 cents in Winnipeg. The settler thought he was not getting his due, but no doubt continued prosperity and a united action on the farmers' part will tend to do away with this seemingly large difference.

Our next work was some retracement in township 13, range 29, west of the fourth meridian and upon completion of the third correction line we started for Lyndon P.O., passing through the town of Leavings en route. These small prairie towns all give evidence of the prosperity of the surrounding country. There are several good stores in Leavings, where supplies of all kinds can be purchased at about Calgary or Medicine Hat prices. There are also two fair hotels, a butcher shop, a blacksmith shop, livery stables, several churches and a good school. And just here I beg to remark that from Stirling, which is the point where extended settlement begins, northward schools are quite frequently to be seen, and north of Lethbridge the schoolhouse becomes quite a familiar sight.

From Leavings we followed the third correction line to the base of Porcupine hills, and from there along the old '44' trail to Lyndon P.O. which is situated right in the hills, passing en route the fine buildings of the '44' home ranch. The land along this trail is being rapidly taken up, many preferring the protection afforded here to the bleaker locations on the open prairie, and a number of prosperous looking homesteads were passed en route. A large portion of these hills is held by various cattle and ranching companies, and no doubt when their holdings are thrown open many more settlers will take advantage of the opportunity to locate in this district.

Here again I found carelessness in the original subdivision to be the sole cause of making retracements necessary. Although the country is rough and very rolling it should not be an excuse for returning chainages so different to what is actually on the ground, as a little extra time and rechainings would show the surveyor the correct distances, and remove the somewhat disagreeable necessity of admitting errors.

This entire township is very hilly. Trout creek flows along its south boundary and Willow creek along the north, and the summit or divide between the two valleys passes right through the township, and ranges from four hundred to five hundred feet above the creeks. Smaller ravines leading into these creeks cut the surface in every direction making it very rolling and broken. Willow scrub and brush was

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found in many ravines and on the northern slopes of hills, making the locality, in the writer's opinion, an ideal cattle range, and while the land is of excellent quality the very uneven surface would render extended farming operations difficult. The grass on the hills is largely of the spear or arrow grass variety, of a most luxuriant growth, and seems to be very nutritious, every place not covered by scrub or timber affording fine pasture for stock as well as shelter and water. There is a small quantity of very fine timber in the southwest of the township consisting of fir, hemlock and spruce, and apparently this supply increases as you go farther into the hills. Settlers use wood for fuel here altogether, and have no difficulty in securing all that is required, as well as fence posts and logs for stables and outbuildings. A sawmill is located some five miles west of this township, on Trout creek, and is very accessible by a good trail along the bank of Trout creek. The water is all fresh, and I am credibly informed that during the fishing season both Trout creek and Willow creek afford a bountiful supply of trout of which there appear to be at least two varieties.

Trout creek in this township is hardly large enough to make development of power profitable, but I am told that Willow creek is very well adapted for such a purpose, and has ample water and several rapids that could be developed very readily by the construction of dams.

Sandstone is readily obtainable in the southeast portion of the township in section 1, and I am informed can be taken out in Willow creek also, and apparently is a very good building material, as a number of ranchers have used it for foundations, cellars and small outbuildings.

No minerals of economic value with the exception of lignite were found throughout the season, although as noted in my report of township 1, range 13, Sergeant Gillespie of the R.N.W.M.P., has found what he believes to be petroleum, and at the time of my visit was pushing his investigations to ascertain for a certainty.

Game was very scarce throughout the entire range of my season's work with the exception of coyotes, badgers and foxes, which seemed to abound everywhere. A few antelope were seen while we were in township 2, range 29, west of the third meridian. A few rabbits and chickens were seen at intervals during the season, but ducks and geese were very scarce, no doubt owing to the great want of water in this locality.

Along Milk river, in township 1, range 13, several colonies of beaver were noticed, and although we saw none of these interesting and industrious animals the result of the previous night's work was very frequently in evidence.

Upon the completion of the retracement in this township, I thought it best to disband for the season, as the snow was already deep and the weather cold, the last move we made taking us almost the whole day to go four miles. The ground was too hard to mound whenever exposed, and apparently winter had set in, although the settlers all informed me a chinook wind would come and take away the snow very soon. However, on the 27th of November, I moved out to Mr. Erwin's in section 2, township 13, range 29, west of the fourth meridian, where I stored my outfit, and left my horses in Mr. Erwin's care for the winter. Next day Mr. Erwin took us to Claresholm, when I paid off the party and left for Medicine Hat, and thence home at once.

The question of the rights of the squatter and small settler as against the large lease holder is one that is rapidly becoming a burning issue throughout the grazing lands, and the department will no doubt be called upon before long to clearly define the rights of each. During the season we heard both sides, but the solutions are out of the surveyor's province.

During the season the outfit travelled some four hundred and twenty miles, not including travelling while at work, and generally the trails were in good condition, and horse feed abundant in the vicinity of our camps.

Some three hundred and fifty miles of line were surveyed or retraced, monuments restored, or new ones constructed. The temperature was noted each morning at 7 A.M., and a record of the same appears in my diary together with a short note on each day's weather, &c.

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Observations for azimuth and time were taken at every opportunity affording a constant check on all work performed.

The timepiece, Watt transit and four chain steel tapes, all proved to be well adapted to the work required. The transit being especially well thought of, and on clear days, not too windy, the writer had no trouble in finding Polaris at noon, and observations were frequently taken during the dinner hour.

The four chain tape was also found to be of excellent quality and by using the clinometer the roughest country is quickly and accurately measured.

I furnished my chainmen with plummets which were used throughout the work, as I find this method preferable to a drop pin.

The weather was generally very favourable for the prosecution of survey operations. Only three days were lost from rain and one and one-half from snow during the entire season. The high winds that prevail in southern Alberta are somewhat annoying, and require the surveyor to exercise the utmost vigilance to keep his line straight and his chaining accurate.

In closing my report, I wish to express my appreciation of the services of Mr. Paul B. Street, of Toronto, who always performed any part of the work assigned with ability and cheerfulness.

I have the honour to be, sir,

Your obedient servant,

A. H. HAWKINS, *D.L.S.*

APPENDIX No. 25.

REPORT OF ERNEST W. HUBBELL, *D.L.S.*

RESURVEYS AND INSPECTION OF CONTRACTS IN THE PROVINCE OF SASKATCHEWAN.

OTTAWA, January 22, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report of my survey operations in the province of Saskatchewan during the past season.

In compliance with your instructions dated March 30, 1906, I left for Prince Albert on April 17, arriving there late Saturday night, April 21.

On Monday I drove to Mr. J. E. Pollock's ranch, ten miles distant, where my survey outfit was stored for the winter. I returned the following day with both my horses and outfit, the former looking as if they had not been overfed during the winter. My organization station being at Craik, one hundred and seventy-seven miles south of Prince Albert, I considered it more economical to convey my outfit there by rail. Engaging a box-car I loaded my outfit and horses and arrived at Craik on the 27th, where we immediately pitched camp and with my whole party I was under canvas that night.

This small but thriving town of Craik, seventy-three miles north of Regina, is situated on the Prince Albert branch of the Canadian Pacific railway (now the Canadian Northern), and has a population of about three hundred, with many substantial buildings, including two large grain elevators, several churches, two hotels, numerous stores and two lumber yards; it is a distributing point for immigrants and land seekers who wish to look over, purchase or homestead land. It is the centre of a district extending easterly as far as Last Mountain lake (distant twenty-five miles)

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and westerly as far as South Saskatchewan river (distant from forty to fifty miles). At this point for those desiring to cross there is a ferry stationed at the Elbow. The land in the immediate vicinity of Craik is worth from twelve to twenty dollars per acre, an increase of one hundred per cent in the last two years.

The soil, although considered by some to be a trifle on the light side, yields excellent crops. I saw over one hundred acres of wheat adjoining the town, which, when threshed, yielded thirty-seven bushels to the acre, and this is only a fair sample of the produce yielded in the vicinity of the railway, where not so long ago the land was considered by many to be worthless.

The next two days we occupied in overhauling and repairing our outfit, purchasing and hauling supplies, etc., and on Tuesday, the 1st day of May, we pulled out of Craik, and travelling on a good trail as far as Walstad's ranch (distant eighteen miles) camped there for the night. During the next three days we continued our journey westerly, making about fifteen to twenty miles a day, following a good trail most of the way, which meandered through a beautiful rolling, open and undulating country, now rapidly being taken up by settlers of various nationalities. Along our entire route the work of the new settler was very much in evidence, that of ploughing and building predominating. Some convincing idea of the rapid progress of settlement in this district may be obtained when I state from experience that exactly a year ago one could travel on this same trail all day and not see more than one or two houses, whereas now from almost any part of it one can count as many as twenty buildings.

The settlers in this neighbourhood freight their lumber from either Craik, Mortlach or Caron, both of the latter are small and prosperous towns on the main line of the Canadian Pacific railway about thirty or forty miles to the south. The price of the lumber is thirty dollars per thousand.

Land in this vicinity is worth from seven to twelve dollars per acre, and is suited to the growth of wheat, oats, flax, barley, and vegetables, although to ensure bountiful crops considerable moisture is necessary as the soil is with little variation sandy loam.

On May 7, being at our initial point we commenced the resurvey of township 21, range 7, west of the third meridian and we finished the same on the 19th, being delayed a few days by rain. The surface of the northern and eastern part of this township is undulating and rolling. The southern part is broken and hilly comprising a portion of Vermilion hills. The western part is also broken and hilly, this being caused by the huge ravines and gullies which extend down to the banks of South Saskatchewan river which flows through the western part of the township. We continued work in this district until September 25, and covered an area of over seven hundred square miles.

During this time we resurveyed fourteen townships in all, including their outlines, a total mileage of six hundred and forty-two miles in four and one-half months, comprising townships 21, ranges 2, 3, 4, 5, 6, 7 and 8, townships 22, ranges 1, 2, 3, 4, 5 and 8 also township 23, range 3, all west of the third meridian.

By describing in detail the physical features of any of these townships, one is practically describing this section of the country. The surface in general is undulating to rolling except that portion adjoining South Saskatchewan river, which is rough and broken by numerous ravines and coulées extending down to the river. Generally speaking the soil throughout is sandy loam. Occasionally one finds a clay loam with a clay subsoil, and a little black loam is found in the bottom lands and in the dry beds of swamps and creeks. Contrary to general expectations this soil has proved exceptionally fertile; oats, wheat, flax and barley have been successfully raised. It is not unusual for such land to produce as much as seventy bushels of oats to the acre, or thirty-five bushels of wheat to the acre. These crops of course would be off land broken in the fall and would cost the farmer for threshing eight cents per bushel in the case of wheat and six cents per bushel for oats, the owner of the threshing machine furnishing all necessary help. It is usual to thresh about two thousand five hundred bushels a day, the waste straw supplying the necessary fuel for the engine. When a few

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additional machines are in this part of the country the above rate, it is presumed, will be reduced by one-half or thereabouts. However at present everyone is anxious to have his threshing done as soon as the grain is ripe, for at this season of the year, frost is not unknown. The consequence is that the number of machines being limited the demand is great and this accounts for the high rate per bushel. From the time of seeding to that of harvest, in the case of wheat, is from one hundred and five to one hundred and ten days, much depending upon the amount of rainfall and heat. Horses and cattle are obtainable from the Hitchcock-Ferguson ranch or from Wolstad's ranch, both of which are in this section of the country. Horses cost about three hundred dollars per team and oxen about one hundred dollars per yoke; a good cow costs from forty to fifty dollars; wagons are worth seventy-five to eighty dollars, sleighs twenty-eight to thirty-two dollars and double harness twenty-seven to thirty-eight dollars a set.

Farm produce commands a high price; potatoes when procurable sell for one dollar to one dollar and fifty cents per bag, butter thirty to thirty-five cents per pound, milk seven cents per quart, eggs twenty to thirty-five cents per dozen, &c. Hay is rather scarce, but obtainable from Qu'Appelle valley and in a few of the large hay sloughs. In addition the settler cuts and uses the short prairie grass, commonly known as wool-top which is more nourishing than the hay taken from the sloughs and is generally preferred by stock. Hay usually sells at from eight to twelve dollars per ton, but it is not unusual to pay one cent per pound. The price varies according to locality and quality. A considerable amount of wheat straw is used by the farmer for his stock, in fact many cattle get little else during the entire winter and thrive very well, being in good condition in the spring.

Well beaten trails pass over all this section of the country, connecting with the nearest towns on the main line of the Canadian Pacific railway to the south and on the branch line of the Canadian Pacific railway to Prince Albert to the east. The Canadian Pacific railway are now constructing a branch line from Moosejaw to the Elbow and when finished it will not only increase the value of the land, but greatly facilitate transportation, which the country urgently needs to meet the requirements of the great influx of settlers.

Building material and supplies are procurable in the small towns at moderate prices and are freighted to the homesteads of the settlers by means of horses and oxen. For fuel, the settler burns coal, generally. This is obtainable at most of the railway stations on payment of seven to nine dollars per ton. A little wood is to be had from some of the coulées which extend down to Saskatchewan river, also some wood of small dimensions is obtainable from a belt of sand hills in townships 23 and 24, range 3. However this belt is being rapidly depleted to supply the needs of the settlers for both building and fencing purposes, and in a year or two, perhaps less, wood of any description will not apparently be procurable, except at the railway stations. In this connection it is unfortunate that there do not appear to be any indications of coal or lignite veins in this section of the country.

Good drinking water is rather hard to obtain in many places and until wells are extensively dug this will continue to be a slight detriment to this otherwise fertile portion of the province of Saskatchewan. There are very few sloughs or creeks in which the water is palatable, therefore wells are being dug, and water is usually obtained at a depth of from twenty-five to seventy-five feet, although in many instances the supply is limited and often alkaline. Owing to the unusually small fall of snow and the limited quantity of rain for the past two years, most of the sloughs and many of the creeks shown on the maps as containing water have now little or none. for instance, Qu'Appelle river is entirely dry in many places.

As a rule, the soil in this section of the country is inclined to be light; it follows that a considerable amount of moisture is necessary to ensure good crops and vegetation. The system of 'boring' is now adopted by many of the settlers, and doubtless in a year or two good water will be plentiful. There are several excellent springs

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in the vicinity which have an apparently inexhaustible supply of pure fresh water, and naturally these are a great boon to the settler.

From personal experience while residing in this part of the country during the greater portion of the last two years, and from information obtained through old settlers, I should say that there are no summer frosts that are likely to do harm, although there may be an occasional hailstorm. On the other hand the heat during the summer months is intense. Vegetation usually commences about April 25 or May 1. At the end of April with the disappearance of the snow spring ploughing commences. May is an unsettled month, one day it may be 100 degrees in the shade, the next cold and raw, accompanied perhaps by a flurry of snow. Usually there is considerable rain during the months of May and June, and the next few months are dry and very hot, with an occasional thunderstorm. Last season we had, during the month of May, rain on fifteen different days, during June twelve days' rain, while during July and August the weather was very hot and a few thunder storms occurred. The first slight frost was noticed on August 25, but it did no injury to the crops. Throughout this section of the province (about seven hundred square miles) we did not perceive any indications of coal or veins of lignite, nor in fact minerals of any description.

On the tops of the numerous ridges boulders are more or less frequent, and doubtless, as has been done elsewhere, will be utilized by the settler for building purposes. I understand they make substantial, durable buildings, which give general satisfaction. Owing to the scarcity of lumber, many of the settlers build their houses out of sod. These sods are first ploughed in furrows, then cut into dimensions of 2½ feet x 14 inches x 3 inches, and laid on each other, similarly to the placing of bricks, and with the addition of a few supports on the inside make a very comfortable warm house or stable; if they are well made and lined with lumber on the inside they will last for years. Speaking in general terms of that portion of the province of Saskatchewan extending from Prince Albert in the north to Willowbunch in the south, from Melford in the east to Swift Current in the west, covering an approximate area of thirty thousand square miles, twenty-five thousand may readily be classed as excellent agricultural land; of this portion, where I have been engaged in surveying operations for the past two years, I may say, having travelled over it during that time more than once, that it is a beautiful extent of uninterrupted farming country, with vast unknown resources which one is unable to estimate with any degree of accuracy. It is being rapidly settled by a superior class of immigrants, many of whom might well be designated Canadian-Americans, men born in Canada who emigrated to the United States, lived there many years, married, became possessed of property, and being persuaded that they had now an excellent opportunity to improve their positions have sold out, returned to Canada, bought land and taken up homesteads in the great West.

When one contemplates the vast unknown possibilities of this country where as yet everything is new and in the experimental stage the future prospects are overwhelming and as a crude estimate, I venture to state that in the above defined limits, for every square mile now under cultivation, there are two hundred square miles of virgin soil. There is a considerable portion of this area which cannot rightly be designated strictly agricultural, but which is ideal for stock raising, more especially those portions adjoining Saskatchewan river, that portion comprising various ranges of sand hills, and a large area in southern Saskatchewan bordering on the Notukeu and Wiwa creeks and also on Wood river. This latter portion is a paradise for ranchers, and in it a number of ranches are now located, one of the largest of these being the 'Turkey Track Ranch,' situated about thirty-five miles southeast of Swift Current and possessing about sixty thousand head of stock. I passed through one enclosure in connection with this ranch, where there were four hundred Hereford bulls.

To a great extent the settler and rancher are dependent the one on the other, and views expressed by both to me were to a certain extent reciprocal, the two occupations being so closely allied.

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It struck me that it might be advantageous (if possible) to set apart certain portions of the above mentioned lands for stock raising as most of it is entirely unfit for agricultural purposes and practically valueless to the farmer, while consisting as it does of broken hilly land, huge ravines, gullies and coulées it would afford excellent protection to the stock during cold weather. The original survey of the townships in this vicinity was fairly well executed, and with but few exceptions, the position of the original survey monuments were easily discernable, more especially to the practised eye. When these surveys were made in 1883, quarter section posts were not used in this neighbourhood (there being no wood to make posts) the only distinction between the mounds erected, was an iron tube placed at the section corners, upon which was placed a square tin with section numbers stamped thereon, these tins having in most instances disappeared, there was no distinguishing mark left to show a settler or prospector his exact locality. As a result much time was lost, it not being infrequent for a settler to squat on the wrong quarter section, and confusion naturally followed.

It is imperative that proper distinguishable marks be at all section corners at least and I respectfully recommend that all the townships surveyed in 1883 and 1884 be remarked. I may say in connection with my season's surveys that I destroyed a number of old river lot mounds, and that the greatest number of miles surveyed in one day was fifteen. The weather during the whole season to November 15, was all that could be desired for surveying operations, and the trails were excellent.

On September 28 I left Craik to examine and, if possible, to correct some errors in the vicinity of Last Mountain lake, a beautiful sheet of water, fresh and pure, sixty miles long, and averaging two miles in width; it is also quite deep. Excellent fishing and shooting is afforded the lucky sportsman, who is fortunate enough to spend a few days on its delightful waters. I had the pleasure of hauling in a whitefish that weighed eight and one-half pounds; pickerel and jackfish are very numerous, and in fact quite a large fishing industry is carried on here. Also the many islands afford good breeding grounds for ducks and geese. The natural inference regarding this beautiful and attractive lake is that it forms an ideal summer resort, in fact, even now, on almost any day, numerous gasoline launches and smaller craft can be seen cruising on its clear waters.

After I had completed the work here satisfactorily, we moved to township 27, range 24, where I did some more correction work. It was here that I verified an error in the bearing of a meridian of $11^{\circ} 46'$ —which had caused considerable dissatisfaction among the settlers, and upon which I duly submitted a detailed report to you. I then moved to township 29, range 26, and did some work there, afterwards returning to Craik, following a well beaten trail which led through a beautiful, open, undulating and well settled district. In every direction threshing operations were being conducted; I was informed that the average yield of wheat was twenty-three bushels to the acre. The farmers haul their grain from here in large wagons, specially made and containing one hundred bushels, to the elevators in Craik.

Arriving at Craik I completed some correction work in township 24, range 28, and then proceeded to township 19, range 29, and surveyed some meridian outlines and their connecting chords and also did some correction work. I then retraced both sides of the road allowance between townships 18 and 19, range 29, where a large error exists, also the meridian outlines adjoining the correction line, and forwarded you a detailed statement as to how matters might be rectified. The great trouble lies with the land already patented, and settlers who gain by an error in survey are very loath to agree to any change in the original survey monuments. On October 18 I left here for Swift Current to inspect certain contracts south of the town, where after a tedious journey through hilly country with few trails we arrived on the 23rd. While on this trip we passed through many small towns on the main line of the Canadian Pacific railway, and it is really astonishing to note the growth and progress made during the past year, besides the increased value of land and property.

At Swift Current where I remained a day the population has doubled during the

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past year, and property has increased in value amazingly; everybody appeared to be working, and apparently there was plenty of work for everyone. In all these towns and all through the west real estate appears to be the password. From Swift Current I travelled southeasterly to township 11, range 12, where I carried out your instructions, and on November 1 moved camp easterly about ninety miles to inspect certain contracts in that vicinity. My route lay along the valley of Notukeu creek, a fine stream of fresh water having an average width of fifty feet and quite deep, with fairly high banks. The country passed over is a continuous stretch of open prairie, with an occasional clump of willows on the banks of Notukeu creek. The surface is generally rolling, but quite hilly on the east side of Wood river which is a fine stream of fresh soft water and has considerable wood growing on its banks, suitable for fencing and firewood. In fact this is the only firewood in this section of the country which is unsurveyed and practically uninhabited, except by a few ranchers. The country is admirably adapted for ranching. The soil is sandy loam and no doubt as fertile as other sections of the country with the same kind of soil. We passed several large bodies of water, the largest being Johnston lake and the Lake of the Rivers, the water of which unfortunately is unpalatable. Hundreds of antelope were seen daily during our travels, occasionally jumping deer, large prairie wolves, foxes, coyotes, badger, also prairie chicken and countless thousands of duck, and geese of all varieties. One has to be an eyewitness to the flight of these wild fowl to the southward during the fall to even dimly conceive an estimate of their numbers or the vast quantity of food required by them.

On November 15 while in camp near the Lake of the Rivers, we were prevented from completing our work owing to an unexpected blizzard, which raged for four days and four nights, covering the ground with snow from three feet deep on the level, to twelve feet deep in the ravines, most effectually covering all fodder for horses and making wheeling almost impossible. As we were fifty miles from wood, and the weather extremely cold, I considered it not only advisable but compulsory to make the nearest town which was Moosejaw, distant about seventy miles. Owing to the unusual depth of snow, I was obliged to leave behind most of my outfit. Our journey to Moosejaw was trying, cold and most strenuous, as we had to break the trails for the horses which soon gave out as a result of being half the time down in the snow, which was always even with the wagon box. Having but little wood we felt the severe cold very much, as provisions could not be properly cooked, nor could we get thoroughly warmed, everything being frozen. We arrived at Moosejaw on the 23rd, both men and animals thoroughly exhausted, but thankful. Here we were told that this blizzard was unprecedented, and besides the loss of many cattle, several men were reported missing, in fact, subsequently, a man and his horse were found frozen to death within a few hundred yards of where we had passed.

After resting a few days, I hired two sleighs and sent back my men and horses for the remainder of my outfit. They, though better equipped and more prepared, had an exceedingly rough time, but brought in the outfit which we stored for the winter at Mr. A. W. Annable's ranch, Moosejaw.

Before closing my report, I desire to bring to your notice, the destruction of numerous mounds and pits by many settlers who, when ploughing, carelessly ignore the survey monuments and plough or harrow them over, thus filling the pits and obliterating the mounds. I suggest that some stringent method be adapted to prevent further destruction of these monuments, which the government is endeavouring to perpetuate for the settler's benefit, and which entail the expenditure of large sums of money. I also wish to point out that there is a great necessity for a properly conducted ferry to cross Saskatchewan river at a point in the vicinity of Log Valley. Considerable risk is run and much time is now lost in crossing, the traveller having to either swim his horses and ferry his wagons and belongings across with the best means at his disposal, or travel around by the Elbow, thus entailing an extra journey of from sixty to eighty miles.

During the past two years an epidemic of glanders has been prevalent throughout this section of the country, in fact so much so that the government sent veterinary

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surgeons to the various ranches to examine and report thereon, with the result that many horses were shot, and the disease was practically stamped out.

While in Moosejaw, I had the pleasure of being driven to and shown over and through the Moosejaw nursery, situated about a mile to the south of the town and located in a most beautifully sheltered spot, comprising about ninety acres. It is surrounded by high banks through which runs Moosejaw creek, utilized by the Company as a water supply and for irrigation purposes. Thousands of young trees of every description, and endless varieties of shrubs are kept for experiment and sale. Vegetables of all kinds are grown, and in the four large green houses (of the latest improved designs) flowers of every variety and green vegetables are always being cultivated. Although still in the experimental stage, the nursery has proved profitable beyond all expectations, and the supply being not nearly sufficient to meet the demand. I write the above as an illustration of what can be done in this country of surprises, as many people are under the impression that vegetables and flowers cannot be grown successfully during the winter months.

In conclusion, I wish to record my appreciation of the services rendered by my assistant, Mr. R. Oscar Spreckley.

I have the honour to be, sir,
Your obedient servant,

E. W. HUBBELL, *D.L.S.*

APPENDIX No. 26.

REPORT OF A. W. JOHNSON, *D.L.S.*

SURVEYS IN THE WESTERN PORTIONS OF THE RAILWAY BELT.

KAMLOOPS, B.C., February 5, 1907

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—Having sent instructions to some of the men to meet me at Lytton, I left Kamloops on February 19 for the Nicola.

My last year's aneroid elevations on the railway belt did not check out well, and I wanted to get a reliable height for my starting point on Spius creek. As a railway has been built up the Nicola valley since I was there, this was easily got, and I went on to Lytton, where Mr. Irwin, the Indian agent at Kamloops, was waiting for me. He wished to find the position of certain improvements near Indian reserve No. 27. Mr. McKenzie, agent of Dominion lands, of New Westminster, came up a day or two later, and he helped me with the final adjustment of lots 1460, 359, 1 and 2. The last two had been surveyed in the Caribou days, but all monuments were gone, and I had to survey them again, conforming as much as possible to the old notes and sketches. In my opinion it is a great mistake to use wooden posts at all, whether at quarter-section corners or any other. Even a cedar post will not last more than forty years though left absolutely undisturbed, and they will not stand much knocking about after twenty. I would also suggest that the iron posts supplied should be of better quality. Some of these I have had this year were so rotten that a man could break them with his hands. The ideal monument for British Columbia is a stout iron post and a pile of heavy stones.

Pits can be traced for perhaps ten years if they happen to be dug on the level and left quite undisturbed by stock, whereas a stone mound of regulation size, es-

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pecially if made of large stones, is practically everlasting, and I have never seen one so much disturbed in this province, even by stock, that there was any difficulty in identifying it.

On the 27th most of the party went to Hope, while I went up the Fraser with one man to put iron posts in at some of the section corners near the railway belt limit, my supply having run out during the previous fall. This took a couple of days, and we then followed to Hope.

In 1902, I made a preliminary survey of this townsite, and left iron piping at some of the main street intersections. The place was surveyed originally in 1861 by the sappers and miners who built the Caribou road, and wooden posts were put in. Nobody knew of the existence of any of these original marks, and though I worked for months in the townsite it was not until the survey was almost complete that I succeeded in finding one. It tallied very closely indeed with my own work, which was based on old fence lines and such old buildings as were reported to stand on lot lines. As there are two or three people in Hope who have been in the town since 1860, I was able to get fairly good evidence, though no really authentic starting points. The Hudson's Bay company once cleared practically the whole townsite to grow feed for their pack trains, but it has been allowed to grow up again, and is now covered with dense bush except where the few houses are.

It is patiently waiting for a railway, with the advent of which a tourist traffic is certain to spring up, for a pleasanter spot for a summer holiday could not well be found. There is splendid trout fishing close to the village, mountain climbing 'ad nauseam,' and big game shooting for those who like to take the risk of climbing round giddy corners after goat, or the trouble of forcing their way through the interminable vine maple and huckleberry brush to the high open slides, every one of which is the feeding ground and exclusive property of some bear.

Besides making the resurvey of the townsite itself, I put monuments in at several of the corners of surrounding lots, and as far as possible made the survey between Hope and Silver creek rigid. I have spent a great deal of time in and near Hope, and have had the invaluable assistance of Mr. McKenzie in every way he could afford it, and I feel convinced that with the proper data available, and bearing in mind that all landowners who have seen the survey are satisfied, it would be a waste of time and money to go over the work again.

On April 16, we went down to Sumas lake by canoe. While here I made a correction in my resurveys of lots 225 and 226, and as soon as possible returned to Hope, picking up a few horses on the way. I also sent to Nicola for ten horses by a man who was buying some there for himself, and began a traverse of the Similkameen trail before they arrived. On the way up this trail we ran a couple of section lines at what is known as Lake House, or Beaver Lake, and after reaching the limit of the railway belt ran along it as far as my last post in 1905. My tie came out exceedingly well to all appearances, but I found afterwards that there were two mistakes, equal and with opposite signs that neutralized each other, one on the traverse up the Similkameen trail, the other somewhere on the railway belt limit of last year. Therefore in September I came back and re-ran this part of the limit. From the Similkameen trail southward the belt limit takes to the mountains in earnest. The first half mile leads up a two thousand feet precipice, and when we moved camp the only possible place to get up the mountain was two or three miles down Skagit river. We camped three thousand feet above the valley, arriving in small and very much scattered detachments, with in many cases much smaller packs than were gaily strapped on in the last camp. As tents were among the things thrown away, it was unfortunate that it should rain that night, and there were some very unhappy men around the bacon and beans next morning.

The mountains are so precipitous here that I had to do a good deal of triangulating. Up to a height of five thousand feet above the sea they are covered with dense balsam forests, but the wood is soft and full of knots. Up to six thousand

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feet there may be odd clumps of dwarf balsam or juniper bushes, but I think that six thousand five hundred may be considered extreme timber line. There is practically nothing after six thousand.

The railway belt limit keeps very high, in fact, runs over the top of Marmot mountain nearly seven thousand one hundred feet high. It goes down into thick balsam again along the north boundary of township 2, which is parallel to Marmot creek, and then gradually works up on to Silvertip mountain, which is the highest and most imposing mountain north of the international boundary in this district. According to my aneroid, checked by vertical angles read by transit on other known elevations, it is eight thousand seven hundred feet above the sea. The north side is inaccessible and two small glaciers are perched in the only place level enough to stay on. When I say inaccessible I mean from the ordinary human being's standpoint, not from that of a full-fledged member of the Canadian Alpine Club. I have tried it from that side with an Indian, who had a marvellous head for heights. We persevered until we found ourselves sitting on a knife edge with nothing at all on three sides of us. As far as we could see nothing but a balloon would take us up to the top. When you come to think of it an air-ship is the solution of the surveying problem in British Columbia. You could work for miles round one permanent camp and above all things there would be no packing. The south slope of the mountain is comparatively easy, and the view from the top, magnificent, but you wonder where the land is. For a hundred miles in all directions there seems to be nothing but rock and ice. The slides below the glaciers are very steep and covered with dense vine maple and cypress so dense that it was very difficult indeed to force your way through with a pack. We took our bundles straight across one of these slides and tackled the opposite ridge. Unfortunately we struck it at a very bad place and the brush was so thick that we could not see anything ahead. This was the worst pack I have ever had. The climb itself was insignificant, some eighteen hundred feet or so, but with sixty pounds on your back you have difficulty in negotiating corners that are comparatively easy when travelling light. Twice we had to unload, climb into positions over one another's heads and with infinite care pass the packs up from man to man. Most of us did at last get up, but two of the stragglers did not turn up till night, and one man only got in next morning. Naturally enough he was the cook. When we got off Silvertip we were in the valley of Klesilkwa, which is separated from Silver creek valley by a low pass, about two thousand feet above sea level. I took the belt limit across this valley and ran parallel again for three miles along a mountain composed of solid granite. There are two miles of old rock slides with huge granite boulders, from the size of one's head to that of a house, requiring only a little dynamite to furnish the finest building stone I have ever seen. There are hundreds of thousands of tons of it that do not even require quarrying.

The Klesilkwa side of the pass is level and very swampy. It averages half a mile in width and there is land enough for some settlement when the timber has been taken out. This is mainly cedar and hemlock.

On the Silver creek side of the divide the valley narrows down and is not more than a quarter of a mile wide in most places. There is fir here besides cedar and hemlock, but not much land.

I ran a series of section lines down this valley as far as Silver lake, and connected with Hope by triangles over Hope mountain. I made this survey because there was an application for land at the south end of Silver lake, for the purpose of raising cattle. I do not think I have seen anywhere in the world a more unsuitable or hopeless place for raising cattle in. Dense crab apple and willow thickets grow immediately around the lake at its south end, alder and cottonwood along the creek, and the rest of the valley is covered with the densest growth of cedar, fir and hemlock. There is not a stalk of natural food and no range on the mountains which are precipitous, and only suitable for mountain goat.

When I tied on to Hope I found a mistake which was located during the following

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week, and I left Mr. Weld with a small party to make necessary corrections. I should not like to send this report in without saying that Mr. Weld was a very great help to me this year. We had a difficult party to handle, and the position of assistant is not at all a pleasant one. In spite of these facts he finished the corrections on time, and I doubt whether many men under the same circumstances would have finished them at all. While these corrections were being made I took the rest of the party and worked over the two ranges separating Klesilkwa creek from Chilliwak lake.

The first of these ridges is slightly over seven thousand feet and the second not much more than six thousand. Both of them were covered with huckleberries and blueberries and as a result bears were very numerous, especially as the above berries are a failure in other parts of the province. These bears were a real hindrance to the work, for the Indians would not go away alone without a rifle, and in one case refused to cross a valley at all. I laughed at them for a long time and occasionally went ahead myself to show them that their fears were groundless. However, one night while coming down a mountain side to supper with one of the Indians, we ran across a big bald-faced she-bear and cub. They were directly in our way, so I shouted to scare them off. It did not have the desired effect at all for the old bear immediately turned and charged. I think we both had pocket knives, but they did not seem very comforting so we fled. She may not have come very far, we did not stop to see, but she did not catch us. I think it is better to let bald-faces and grizzlies severely alone if you are unarmed.

There are goats on the highest ridges and plenty of marmots or whistlers as they are called here. The Indians call them the whistle pig.

The descent into Chilliwak lake was down very steep smooth rock at first, so steep that it was out of the question to put the section corner in.

We joined the pack train on the lake at Depot creek on August 11. The packers had just finished building a canoe for our use while there. Here also was a party working on the international boundary. For a week I worked from this camp, and then packed clear to the top of the ridge on the west side of the lake.

The belt limit went over some very bad country west of the lake before reaching the first ridge, country comprising ravines, rocks, precipices and, slowest of all, 35° slopes covered with dense balsam. Once out of the timber I put most of the work in by triangulation, because most of it lay over inaccessible rock.

On August 24 I got down to the international boundary, and measured westwards by means of triangles. The bases were exceedingly short, but I took great care with the angles and on the 28th tied on to a post I set four years ago.

There was little or no game on the ranges west of Chilliwak lake. There appeared to be no feed. There is no agricultural land between Silver creek and the international boundary, except a little on Chilliwak river and at the south end of the lake. A little good cedar and fir may be found around the lake, but the great bulk of the timber is knotty balsam, which as far as I know is no good for anything but firewood and second rate pulp.

Minerals are worked to some extent both in Slesse creek and Middle creek and rumours are heard from time to time of big veins between Skagit river and Chilliwak lake. It is probable that at no very distant date the lake will be a summer resort. The fishing is very good, the scenery of course gorgeous and there is nearly always a sailing breeze.

It would be easy to build a good wagon road up to the lake which then could easily be reached in a day from the town of Chilliwak.

On September 10 we began work on the correction of the railway belt limit from the northeast corner of section 13, township 3, range 23, to the last post I put in last season. It rained a great deal while we were here and the country was very rough indeed, so rough that we had some very uncomfortable moments chaining. A mile on a map looks such a short distance and so easy to chain that people who have not scrambled painfully up a rock with a chain tied to their belt with a long hard drop coming

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if they let go cannot realize what an enormous distance a mile sometimes is on the ground.

From Hope I sent two men back to Kamloops with the twenty horses that comprised the pack-train. They will do better in the upper country than at Sumas where they were last winter. At least they cannot possibly come out thinner in the spring. I was fortunate in my two packers. I doubt whether they could be beaten in British Columbia. One of them I left in charge of the base all summer. It was his duty to see that everything I needed was moved forward into valleys that the belt limit crossed. This left me at liberty to push the flying camp forward on line, because I was always morally certain that when I dropped down for supplies I should find him in the desired spot.

Before leaving this district I ran the boundaries of lots 5 and 6, near Hope, which were in doubt, and on the 22nd moved down to Agassiz by canoe. After a couple of days work in section 28, township 3, range 28 I got word that some work at Sumas was very urgent and I moved down at once by canoe to the south end of Sumas lake in township 19, east of the coast meridian. Nearly all the land around this lake was surveyed thirty or more years ago, and as it is covered every year by water, the old monuments have in most cases disappeared long ago, so that it is extremely difficult to do anything with it, but I think that what few corners I did re-establish are as near their original positions as is possible to put them now. While here I did some work of the same nature on the upper Sumas Indian reserve and on lot 227, group 2. I also made a small traverse in section 13, township 20, east of coast meridian.

On October 11, I went up to Lytton with Mr. Weld and one man. We did a few days work here on lots 1 and 2 and in section 35, township 14, range 27, west of the coast meridian and then I took a couple of weeks holidays, partly for my own ends (I wanted a grizzly and got one) and partly to get some idea of how to tackle the country between Harrison lake and the Fraser, where I shall be next season.

On November 6 I went down to Agassiz again and next day continued the work on islands in the Fraser that I had left when asked to go to Sumas. Besides this there was a good deal to do around the village itself on lots 49, 19, 10, &c. In this I had the assistance for a day or two of Mr. McKenzie, who knows a great deal more about the land in the New Westminster district than anybody else and we were able to do a good deal of resurvey work. I tried to find posts in section 5, township 4, range 28 up Maria slough, but was unsuccessful, so I wrote for the old field notes and paid the men off for the season, getting back to Kamloops on December 4.

The season has been in many ways remarkable. While at Hope, in March and April, the weather was glorious, which is unusual at this time of year. May and June were wet, but July, August and the first part of September were finer than anything I have seen in this district. Had it been otherwise the work would have been much more unpleasant even than it was. We seldom used tents, but slept out under the stars, and the fine weather enabled us to carry fewer clothes than usual, which is a great point when packing. If I had not had a nucleus of men who had been with me for years and who did not like to see me left in a hole, I should probably have finished the work with Mr. Weld and a party of two. As it was we left Hope seventeen strong and came off the international boundary with nine. Some had cut themselves, some were ill, but most were sick of packing. We had three months mountain packing with little intermission, moving camp on an average three times a week, and men will not do it if anything else at all is to be had. It did not improve matters when we got down to the south end of Chilliwak lake and found men on the point of leaving the boundary survey because there had been no fresh vegetables for three whole days. We had potatoes twice in three months.

The fall was wetter even than that of last year, which is saying a great deal, and we had several days when it was out of the question to do any work at all.

I have the honour to be, sir,

Your obedient servant,

ALFRED W. JOHNSON, D.L.S.

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APPENDIX No. 27.

REPORT OF J. A. KIRK, D.L.S.

SURVEY OF PART OF THE NORTH BOUNDARY OF THE RAILWAY BELT IN BRITISH COLUMBIA.

REVELSTOKE, B.C., March 14, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour in accordance with my instructions, to submit the following report of my survey to establish the north boundary of the railway belt at Blaeberry creek in the province of British Columbia.

The survey consisted of two traverse lines run from the northeast corner of section 20, township 28, range 22, west of the fifth meridian up the valley of Blaeberry creek to the objective point, a distance approximately of twenty-five miles. My report may therefore be appropriately styled 'A report on that part of the valley of Blaeberry creek within the railway belt.'

Blaeberry creek rises in a large glacial area, crowning the divide of the Rocky mountains at about 117 degrees of west longitude. It flows southerly for about twelve miles and enters the railway belt at the north boundary of section 10, in township 31, range 20, west of the fifth meridian. It continues southerly and southwesterly through ranges 20, 21 and 22 to its confluence with Columbia river in section 30, township 28, range 22, a distance of between twenty-six and twenty-seven miles.

The west side of the valley is paralleled by a range of mountains that rise in lofty and picturesque peaks, broken only by the narrow valley of a stream which rises in the glacial fields on the divide and flows southwesterly to its junction with Blaeberry creek at a point about three-quarters of a mile south of the boundary of the railway belt. As this stream materially increases the volume of the Blaeberry, it may appropriately be designated the 'west fork.'

On the east side a ridge runs parallel to Blaeberry creek from the north boundary of the Belt, southerly for about six miles. The flanks of three ridges bearing southeasterly constitute the east side of the valley between this point and the valley of the Columbia. The streams flowing through the three valleys thus formed comprise the tributaries of Blaeberry creek from the east. The middle one I have named the 'east fork,' as it is larger than the other two together, and contributes to the main stream nearly if not as much water as the 'west fork.' The discolouration of the water in the summer shows that the 'east fork' and the stream to the south of it are fed by glaciers.

Several small streams rise on the faces of the mountains on either side of the valley and from springs along the bordering flats, and these in many cases disappear by sinking under the surface. The valley is naturally divided as to its physical features into three parts, which for convenience of reference, I have named the upper section or gravel flats, the central or rocky section, and the lower or bench land section. My description will begin with the central or rocky section.

Central or Rocky Section.

A series of ridges which cross the valley and unite the mountains on either side, extend southerly for about five miles from a point about a quarter of a mile above the mouth of the 'east fork.' Through these ridges, which consist of a species of soap stone soft enough to be scratched by a finger nail, the creek has cut a channel from

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fifteen to seventy-five feet in width. In places the vertical walls of the canyon thus formed are over a hundred feet in height. Through this section the creek is a succession of rapids, as the total fall is probably not less than two hundred and fifty feet. Further reference to this section is made in the paragraph following the description of the upper section.

Upper Section.

Proceeding up stream from the canyons, the bottom of the valley is a gravel flat, on which, speaking generally, there is a light covering of soil that increases in places to several feet in depth. It seems evident that the rock at the entrance to the canyons has not been cut out as low as the grade of the rock forming the true bottom of the valley above, and that the dam thus formed holds the gravel forming the flats as in a basin. The creek meanders with a swift but uniform current in a channel that is constantly shifting during times of high water. An expanse of gravel bars has thus been formed that is constantly increasing in width by the erosion of the banks.

The valley averages about half a mile in width. The mountains forming its bounds have the usual features of the Rocky mountains. The summits are destitute of vegetation, and often rise in sharp ridges and peaks of fantastic outline. The faces of the hills are frequently a succession of slides, while the slopes at their bases are composed of sharp-edged rocks that have fallen from higher levels. These slopes are usually covered with soil. The soil on the west side generally reaches higher levels and is of better quality and greater depth than on the east side.

The country is covered with a growth of spruce, cedar, fir, hemlock and pine, spruce predominating. On the lower levels of the mountains and on the flats along the shore of the creek, there are belts of timber that will run from twelve to twenty-four inches in diameter at the butt end. The cedar is usually hollow and not large enough to have sufficient sound wood to make it valuable. The other woods are generally of good quality, but as is common in this section of the country, the trees contain but a small percentage of high-grade or clear lumber. I estimate that there is between three and four square miles carrying from twenty-eight to thirty million feet log scale of merchantable timber in this section. In addition to the timber described, the country is covered with a smaller growth admirably adapted for pulp wood.

This section is remarkable for the absence of traces of forest fires. If my conclusions are correct, this is due to the following causes. During the summer months, while the country in the vicinity of Golden is parched for want of rain, storm clouds are often seen approaching from the west which turn to the left at Mount Moberly and continue up the valley of Blaeberry creek. Along the upper reaches of the creek these clouds precipitate their moisture. This phenomenon probably prevails during the winter when the precipitation augments the glaciers in which the creek rises. The greater portion of the rain falling on the rocky surface of the summits unwatered by the Blaeberry, does not form into creeks, but descends rapidly to the debris at the base and percolates through the soil, thus keeping it constantly moist, while the flats bordering the creek, while not swampy, as a rule are full of springs from the same source. This feature is an important point in connection with the area I am now describing as it appears to thoroughly protect the forest from fire. It is true that burnt trees are to be seen high up on the mountain side that have grown on small ledges of rock, but this fact accentuates my point, as in such places the moisture rapidly drains off.

Central or Rocky Section—(Continued).

In the section cut by canyons the gravel flats are replaced by bench land through which ridges of rock protrude. The country has been overrun by fire and only isolated patches of a large forest remain. The precipitation decreases as the Columbia valley is approached, while the drainage from the mountains and local rainfall, sinks rapidly through the porous, sandy and gravelly soils of the bench lands, leaving the surface

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dry, and in a favourable condition for the spread of fire. Young forests of pine, spruce, &c., are covering the brûlé.

The trees are small yet, but in time if protected they will have a commercial value. There remains near the southern part of this section about a third of a square mile of fine spruce, balsam, &c., estimated to contain about five million feet, log scale. Along the banks of the east fork there is a fine body of spruce and balsam, but I had no opportunity to go through it.

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From the foot of the canyons the stream flows in a channel from seventy-five to a hundred feet wide, for about a mile and a half. From this point to a small canyon near the railway it meanders through gravel bars similar to those described on the upper reaches of the creek. Emerging from the canyon, which is almost a quarter of a mile long, the creek crosses the flats of the Columbia and soon forms part of that river. In this section the valley widens. Bench lands that have been overrun by fire, and on which a new forest is appearing, are its principal features, until it merges into the valley of the Columbia.

Respecting the valley of the Columbia, I would refer to my report on the survey of sections 1, 2 and 3 in township 28, range 22, west of the fifth meridian, particularly to the part reading as follows:—

I have been told that this land is part of a timber reserve, and therefore not open for settlement. There is no timber here, and apparently never will be, as the new growth is confined to willow and poplar. If it is supposed that by keeping the place in a natural state an efficient fire break is provided between the railway and the country to the north, I would point out that the dead timber now strewn over the ground is very inflammable and a source of danger, while a cultivated field cannot be surpassed for checking the spread of fire. I would therefore take the liberty of suggesting that if this land is in a timber reserve, that the reserve should be withdrawn from that part that may be called the valley of the Columbia.

A wagon road from the town of Golden runs northwesterly alongside of the Canadian Pacific railway through Moberly, a flag station, to Blaeberry creek. This road is kept in repair by the provincial government. From this point a good trail runs along the east side of the creek for about eighteen miles. The gravel bars of the river afford good travelling for points farther north.

The soil throughout the valley is of a sandy and gravelly nature. The prevalence of summer frosts and late springs make its use, for general agricultural purposes, out of the question. Hay could doubtless be grown, but there are no wild hay lands. Feed for horses when travelling is not plentiful.

During the summer months the volume of water in Blaeberry creek is large. In the winter it is said to dwindle to insignificant proportions. The water during the time of high water is heavily charged with silt. The fall in the canyons is sufficient for the development of a large amount of power. The problem of bringing logs down the shifting channels that have been described seems difficult. My opinion is that a dam could be thrown across the creek at the entrance to the upper canyon, that would submerge the gravel bars and permit of the transportation of logs in safety. The extent of country that would be flooded and the damage that might be done would have to be considered when deciding on the height to which the water would be raised. A dam at the canyon near the railway would cover the bars on the lower reaches. As the banks are high in this section, it is probable that raising the level of the water would not affect the adjoining country. Wood is always available for fuel.

No indications of coal or lignite were seen. North of the east fork a mile or two, the mountains on the east side of the valley are strongly coloured with iron; with this exception no indications of minerals were seen.

Bears and goats are plentiful. This valley is of no apparent value except for its timber and pulpwood resources. The upper reaches are the most valuable in this

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respect. The poor and shallow soil is not conducive to timber of large size. The ground seems unable to provide sufficient nutriment for trees after they attain a certain size. Hence the cedar is usually hollow, and large healthy trees of any kind are rare. Still the valley produces fair timber, that with proper protection will remain a permanent asset to the country.

I have the honour to be, sir,

Your obedient servant,

J. A. KIRK, *D.L.S.*

APPENDIX No. 28.

REPORT OF G. J. LONERGAN, *D.L.S.*

RESURVEYS AND INSPECTION OF CONTRACTS IN CENTRAL ALBERTA.

BUCKINGHAM, QUE, February 4, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—I beg to submit the following general report, concerning my survey operations during the past season.

In accordance with your instructions, dated April 1, 1906, authorizing me to continue the restoration surveys in Edmonton district, I started from home for Edmonton on April 23, where by previous arrangement, I had my transport outfit to meet me, and after engaging the men required for the summer's work and purchasing two months' supply of provisions, I started from Edmonton on May 3, for township 56, range 24, west of the fourth meridian. I travelled by way of St. Albert and Morinville, and thence east to the south boundary of the township. From Edmonton to Morinville, there is a good graded road, and as far as we could see on either side every acre is under cultivation. The soil is a good sandy loam, and for its productiveness, I had only to look at the farmers' buildings and dwellings.

Morinville at the time of my arrival, was soon to boast of a railroad and station. The Canadian Northern railway had their grade built that far last December, and expected to have the steel laid by the end of June. Township 56, range 24, is suitable for mixed farming. The southeast portion is thickly settled, and about three-quarters of it is under cultivation. The remainder was heavily timbered, but the recent fires have killed most of the trees and it is now nothing but a mass of windfall and *brulé*.

The Alberta government is helping to build a road through the township two miles from the east outline. This will give the settlers from Legal a more direct route to Edmonton, and will help to open out that northern country.

My next move was to townships 59 and 58, range 22. To get there I crossed Sturgeon river, one mile north of Namao, and thence east along the correction line to Fort Saskatchewan. I then went northeast along the Victoria trail about 20 miles until I came to a small Galician settlement. All this country is thickly settled, the occupation being mixed farming, and considerable attention is devoted to hog raising. In conversation with many of the settlers, I learned that the great drawback is the lack of a continual market for hogs.

No doubt there is a great opening for a firm to establish a large pork-packing industry. There is at present a small plant, but they are not able to even handle the supply of pigs that the farmers have, nor are they even able to supply the Edmonton consumption with bacon and ham. The result is that the merchants have to import

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meat, and the citizens have to pay from two to three cents more per pound. In short, the supply of raw material is there, the consumer is there, but the manufacturer is unfortunately absent.

On my arrival at these townships in which I had a few corrections to make, I found but four or five settlers. They had come that spring, and were busily engaged in making preparations to put up hay, their intention being ranching exclusively. Without a doubt they had chosen a good district, and will make a success of cattle raising, as long as they are not troubled by others who want to grow crops.

Vermilion river passes through township 58, and the valley has an average width of about a mile and a half, where an almost unlimited amount of hay can be cut. To the north there are many large sloughs, with about a quarter to half a mile border of good hay land.

Game is plentiful. I was there but two days, and saw a number of tracks of moose and elk. One of the settlers killed a large black bear, which had four cubs which he caught alive, two black, one brown, and a white one. Along the river bank, mink, marten, fisher, lynx are found, and in one place I saw where beavers were at work, building a dam.

My next move was to townships 54, ranges 20 and 19, to retrace the outlines of Elk park. The government is certainly to be congratulated in making this park reserve. The land is high up in Beaverhills, and is useless for farming, it being only rolling sand hills, and as the elk had already chosen it for their homes, it was but right that the government should perpetuate their choice by fencing them in and leaving them there to multiply.

By wire I was instructed to resurvey townships 51, ranges 2 and 3, west of the fifth meridian; so on July 3, I left Edmonton, going by way of Stony plain.

I would here like to correct the mistaken idea a number of people have that Stony plain is a rough rocky place, as the name would indicate. In fact I never saw a stone in the district; it is level, the soil is a rich sandy loam, and it is known to be the place where the best number one hard wheat is grown in Edmonton district. The place was formerly part of a reservation for a tribe of Indians, known as the Stony Indians, and hence its name.

The Canadian Northern railway have their grade built to within a mile of the post office, and they intend to lay the steel in time to move the fall crop.

All the land was taken up in township 51, range 2, and about one-third of township 51, range 3. The soil in most places is a sandy loam, and the surface is very rolling and covered with windfalls and *brulé*, and cut through by Saskatchewan river, which has in most places high perpendicular banks.

While working west of Edmonton, I came in contact with a number of the settlers, and in conversation with them as to the way they disposed of their grain, they said that a very satisfactory plan, was for a number of them to club together and load a car, and ship direct to commission merchants at Winnipeg, who would either store it in elevators or sell according to orders from the shipper, and that they had at times realised as much as six cents per bushel more than the Edmonton market, and never less than one cent higher.

Having completed the survey of these two townships, I received instructions to discharge half of my party, and to do sundry other scattered surveys. I returned to Edmonton on August 28, and made preparations for a move to township 52, range 12, west of the fourth meridian. The road that I followed was by Fort Saskatchewan and Star, thence southeast on Beaverhills lake trail to Vegreville.

The way in which the country is settling up, was a great surprise to me, for four years ago, there was not a dozen settlers, while to-day the trails are mostly all fenced and the settlers have put up good substantial dwellings and outbuildings, and I did not meet one settler, who was not perfectly satisfied with the country. Around every house they had vegetable gardens and were growing cabbages, onions, cauliflowers, carrots, parsnips, rhubarb, cucumbers, tomatoes, &c., and in many places sweet corn.

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One farmer had started a fruit garden and said there was no doubt about the possibility of growing strawberries, raspberries, gooseberries, currants and other small fruits.

On my arrival at the township, I found but four settlers, who had taken up land in the southwest corner, and as they had been there but a short time they had but few improvements made. The territory generally speaking is rolling, with sloughs and ponds in the hollows.

During the hunting season a sportsman would realize his most extravagant dreams of hunting ducks, geese, swans and pelicans which are there by millions.

I next started for township 56, range 3, west of the fourth meridian. I travelled by way of Dinwoodie to St. Paul's crossing of Saskatchewan river, and thence to St. Paul de Metis. There are not a great number of settlers along this road and those who are there are ranching, doing very little mixed farming. St. Paul is the home of the half-breeds. The mission is situated on the north side of lake Therien, and was started eight years ago by the Rev. Father Therien. After much privation and hard work, they have succeeded in changing a scrub country into a profitable farm and beautiful garden, built a large church, a school and a convent. Although the latter was burned down a few years ago, they are now rebuilding it. The garden is a model of neatness, growing all kinds of vegetables; their pumpkins, cucumbers, celery and tomatoes, would rank with the best I have ever seen in the east. They had a large crop of oats, barley and wheat; the latter would grade No. 1 northern. The mission has a steam thresher, sawmills, shingle mill, flour mill, crusher, together with a full complement of other farming machinery.

From St. Paul I travelled eastward along the old Battleford trail as far as Onion lake. Although the land is subdivided, there are but few settlers. The soil is generally good, but in a few places it is light and sandy.

Mr. Walker, the member for Victoria, told me that it was the intention of the provincial government to operate a ferry across Saskatchewan river some place between Moose and Dog creeks. This would give the settlers railway communication not more than thirty-five miles distant.

However, it will be a matter of only a few years when a railway will be built on the north side of the river; for at the present rate of immigration, such a large tract of good country cannot lie long in wait for railway facilities, and I heard it reported on good authority, that there would be a road in there before three years.

From Onion lake I drove south to Lloydminster. From the river to Big gully, there are no settlers. At Lloydminster I inquired from the land guide, why such a large tract of good land was not settled. He said it was impossible to locate a corner, as there was hardly a mound to be found and no posts, the result is that the land must remain idle until resurveyed. I completed the work near Lloydminster, and then returned to St. Paul, where I examined contract No. 23 comprising townships 59 and 60, ranges 7, 8, 9 and 10. The centre three-quarters of these eight townships can be classified with the best soil in the province of Alberta; at present it is uncultivated and unsettled.

I then returned to Edmonton, arriving on November 17, and as the ground was covered with about a foot of snow I bought three sleighs and started for township 51, range 22, west of the fourth meridian. This township was originally part of a timber reserve, but of late years the repeated fires have destroyed most of the timber.

I did not have time to travel over the reservation, so I made inquiries from the settlers. Mr. J. W. Morton, Tofield, Alta., informed me that the west half of township 52, range 19, has about sufficient timber for the requirements of settlers. Mr. H. K. Adams of the same place says that township 51, range 19, has no timber, save a few clumps of scattered poplar, and that there are some sections of good farm land which has not a tree greater than six inches in diameter. Mr. S. Adams, of Edmonton, says that township 52, range 20, has not more timber than will be required for building purposes for settlers. From what I have seen of the country, I think that the views of these gentlemen are about correct.

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Township 51, range 20, west of the fourth meridian which I subdivided, has no timber; the surface is rolling with numerous ponds and sloughs, and the soil is a sandy loam.

The Grand Trunk Pacific railway crosses the north half of the township, and it is expected that Cooking Lake station will be at the northeast end of the lake. Having completed the survey, I returned to Edmonton, where I discharged the men, stored the outfit and returned east, and arrived at Ottawa on December 23.

I have the honour to be, sir,

Your obedient servant,

G. J. LONERGAN, *D.L.S.*

APPENDIX No. 29.

REPORT OF J. W. McLAGGAN, Esq.

EXPLORATORY SURVEY IN SASKATCHEWAN AND KEEWATIN.

STRATHCONA, ALTA., November 1, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I left Strathcona on July 28, and reached Prince Albert on July 30, where I succeeded in securing a small Peterborough canoe at a cost of \$55. I could not get one large enough to carry provisions sufficient for the trip. I left Prince Albert on August 2 with August Krosse, my assistant, whose salary was \$60 per month. We reached Cumberland House on the forenoon of August 8. We had to get an Indian to guide us across the lake at a cost of \$5 for the trip. I could not get a large Peterborough canoe here, so bought a bark canoe from an Indian for \$13 which, with the one we had, was sufficient to carry our load.

I found that a guide could not be secured here and was told by the Hudson's Bay manager that one could likely be secured at Sturgeon river, north of Cumberland lake, I decided to cross the lake in the afternoon of August 9 in a small tug working for the Hudson's Bay company. We reached Sturgeon river late at night, and next morning I found that no guide could be secured there, so I decided to return to Cumberland and to go from there to The Pas, where a guide might be obtained. We reached The Pas on Wednesday, August 15, where no guide could be induced to leave until after receiving the treaty money, so we were compelled to wait until Wednesday, August 22, when we started off.

The weather had been very good this far on the trip and the gardens looked well at Cumberland and The Pas. Cucumbers, beans, corn and other garden produce were growing well.

I secured Pierre Highway, an Indian, as guide at \$2.50 per day and free tobacco. I had difficulty in getting a guide even at that figure.

(NOTE.—The report covering the period from August 22 to October 23 is taken from Mr. McLaggan's diary.)

Wednesday, August 22.—Started from The Pas in afternoon with outfit as follows: two canoes, tents, blankets, cooking outfit, rifle, shot gun, ammunition, fish net, pair climbing irons, field glass, magnifying glass and compass.

Used climbing irons and field glass in cruising country for timber, climbing high

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trees on hilltops and using field glass where a good view of surrounding country could be obtained.

Reached portage on evening of first day, having travelled 15 miles.

Thursday, August 23.—Made a portage of three miles and camped on Atikameg lake. The country is low and swampy, timber poor and land of poor quality; signs of moose; weather fine.

Friday, August 24.—Made fair run and camped at narrows on Atikameg lake. This is a beautiful lake with small mixed timber of poor quality along shores. Shores are rocky and composed of limestone. The country is level, and the land poor and rocky. Fish, such as trout, whitefish, jackfish and pike, are plentiful. Small fruits, such as gooseberries, raspberries, cranberries, black currants and red currants, are also plentiful. There is no sign of frost.

Saturday, August 25.—Went five miles on Atikameg lake and made two portages into Cormorant lake. Then went five miles on Cormorant lake and camped. The land is poor, timber small and of poor quality. Fish and game are plentiful. A great deal of this country is level and rocky, of limestone formation. Banks of lake about twenty feet above high water. This deposit of limestone may be of great value in time.

Sunday, August 26.—Weather fine, with high wind.

Monday, August 27.—Crossed Cormorant lake, and camped near upper end of Yawningstone lake. There was good spruce timber on north side of Cormorant lake, and along creek between Cormorant lake and Yawningstone lake, and also on south side of Yawningstone lake. This timber is of good milling quality, and would say there is from three to five million feet at this place.

Land north of Cormorant lake is good clay loam, where farming on small scale could be carried on successfully after timber was cleared away. A garden at George Cowan's, near Cormorant lake, looks very well. Potatoes, carrots, onions, turnips and cabbage doing well, with no signs of frost. Saw no signs of minerals on Yawningstone lake. Weather fine.

Tuesday, August 28.—Crossed Yawningstone lake in the morning, and had hard day on Cowan river, low water and driftwood in the stream giving us a great deal of hard work. Country low and flat, with some good spruce timber in spots, but only in small quantities. The greater part of the country seems to have been burned some years ago. Land is a clay loam mixed with sand, and is only fair for farming purposes. Signs of moose and bear very plentiful. Camped about one-half way up Cowan river. Weather fine.

Wednesday, August 29.—Find it slow travelling on this river. Camped about three miles below Black Duck lake. Country low and swampy, with some bunches of good spruce timber on west side of river, about four miles below Black Duck lake, about one million feet in all. Part of land along this river can be drained easily, and would be fairly good hay land. Moose and bear very plentiful. Weather fine.

Thursday, August 30.—Crossed Black Duck lake, and made long portage in afternoon. Country low and marshy, with scattered bunches of spruce and tamarack. Timber of small size, suitable only for railroad ties or pulpwood. Saw limestone on Black Duck lake, and small hay meadows on Upper Cowan river. Land poor and hard to clear.

Friday, August 31.—Slight frost this morning on Cowan river, but not enough to damage wheat. Weather fine in morning, but rain fell in the afternoon. Country low and swampy, and of little use for farming. Had long hard portage in afternoon in muskeg, with water and mud to the knees, distance about $1\frac{1}{2}$ miles.

The timber is mixed and scrubby and of very little value. Moose and bear very plentiful; also mink and other fur-bearing animals.

Saturday, September 1.—Reached Reed lake, made four portages and had a hard day's work, although we made only about five miles. Country low and swampy, and covered with mixed scrubby timber of no value.

Land, a clay loam, which could be farmed if it were drained. Weather fine, with high wind.

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Am leaving bark canoe here, as we do not expect to be bothered with low water after this, and our load is getting lighter.

Moose and bear still plentiful.

Sunday, September 2.—Weather fine and clear, but cool.

Monday, September 3.—Crossed Reed lake in the morning, with fine weather and fair wind. This is a beautiful lake, with many islands. Fish of the following varieties seemed very plentiful: whitefish, jackfish, pike and trout of large size. Water seems to be very deep. On south side of lake is spruce timber of medium size, about one million feet. Country back from lake burned, and growing up with poplar, which should make good pulpwood in a few years. Country very rocky.

Dark coloured granite streaked with white quartz on lower end of lake, and also on river to a distance of six miles below lake. Saw indications of iron on river about ten miles below lake, also good water-power where good business could be done in pulp manufacture at lower end of lake. Banks of this river are about fifty to seventy-five feet, steep and rocky. Saw two moose, also many bear tracks. Geese and ducks very plentiful.

Tuesday, September 4.—Weather fine and warm. Country very rocky. Granite with small streaks of white quartz; also indications of iron.

Splendid water-power above Wekusko lake, very easy to develop.

Mixed spruce and poplar of small size suitable for railway ties or pulpwood on north side of Wekusko lake. Country back from lake and river seems to be all burned. Banks of river higher and more rugged, reaching one hundred feet in some places. Small amount of good land near river. Clay loam, but only in small patches.

Wednesday, September 5.—Weather fine and warm. Made five portages past falls on river, all of which would make fair water-power.

Country much the same as yesterday; rough and very rocky in places, and light sandy loam in other places, with small jackpine and tamarack and small bunches of spruce near the river. The spruce is suitable for milling. Country back from river burned, and very difficult to travel through owing to the fallen timber. This must have been a good timber country before it was burned, and will soon be covered with young trees again if fires can be kept from running.

Saw good slate at falls about twenty miles below Wekusko lake on Grass river, and granite mixed with white quartz on lower end of the lake and on river below lake.

There are small patches of fair land in places, suitable for raising vegetables and garden produce. Fish are very plentiful in lakes and rivers.

Climate seems to be good. Saw butterflies. Hornets and other insects seem plentiful and are still very active. Leaves are green and no signs of any severe frost yet. Saw large black bear and heard timber wolves howling. Bears and moose seem plentiful here.

Thursday, September 6.—Fine and warm. Saw beaver on river to-day, also moose and many ducks and geese.

Country low, but some good land in places. Soil is clay loam mixed with sand, also there are some good hay meadows along Grass river, about ten miles above Setting lake.

Saw more quartz along river, also back from river in many places. I think this part of the country may prove rich in minerals when it is properly prospected, as the quartz seems to extend back from the river on both sides and the country has been burned over, leaving the surface of the rocks bare, making it easy for the prospector. Saw a few bunches of spruce timber near river, some of which have been burned by a fire early this season. Fish and game very plentiful.

Friday, September 7.—Reached lower end of Setting lake; weather fine and clear.

Setting lake is one of the most beautiful spots I have ever seen, fully equal to the Thousand Islands on the St. Lawrence, or to the famous Hudson river, and should in time become a great tourist resort.

There is considerable spruce timber around the shores and on the islands of this lake. This spruce would make milling timber of small size, averaging about twelve

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to fourteen inches in diameter. It is a young, sound, clean lot of timber, and there would probably be ten million feet in all.

Some good wild hay meadows on river above Setting lake and a small amount of good land in spots. Granite mixed with a small percentage of quartz covers the greater part of the country to-day.

Lynx, bear, moose and other animals are plentiful and there is fish in great abundance.

Saturday, September 8.—Reached Keewatin to-day. Weather fine and very hot, must have been 90° in shade at 4 p.m. Camped on river about twelve miles above Paint lake. Made six portages, two of which were around falls where good water-power could be developed. The river takes a drop of over thirty feet at each fall.

Small bunches of spruce and poplar grow along river, but back from the river the country is burned. Some fairly good land, but generally it is very rocky and rough.

Banks of river higher than yesterday, in some places one hundred feet above water.

Saw two moose and some mink. Ducks are here by hundreds and fish are very plentiful.

Sunday, September 9.—Weather fine, but there was a very heavy thunder storm last night.

Monday, September 10.—Reached Paint lake to-day. Weather fine and warm. Crossed to north side of lake in the afternoon. There are quite a number of islands here, with narrow channels between, with rocky shores and small mixed timber of very little value. A small amount of good land on north side of lake. Country back from lake burned the same as farther up river, but growing up again with poplar and other trees. Fish plentiful. Quartz still in sight, but not as plentiful as farther up river.

My Indian guide has not been down Grass river below Wekusko lake before, so is not familiar with channels, which makes travelling very tedious and slow.

Tuesday, September 11.—Fine in forenoon, but rained in afternoon. Spent to-day cruising on north side of lake, but found nothing of any value. Laid up for rain in afternoon. Saw a bear and some lynx and many moose tracks.

Wednesday, September 12.—Laid up with rain and wind to-day in forenoon. Crossed lake in afternoon. Saw fairly good bunch of spruce on south side of lake. This timber is of small size suitable for railway ties or pulpwood. Camped at outlet of river and will start on return trip up river to-morrow.

Weather cold this evening.

Thursday, September 13.—Made good run up river. Camped at lower end of Setting lake. Weather fine, but cold, with quite a heavy frost this morning. Leaves are falling and it begins to look like autumn. Made six portages, none of which was over a quarter of a mile.

Friday, September 14.—Made forty miles up river with fair wind. Camped at mouth of Mitishto river. Weather cool and cloudy, with slight rain.

Saturday, September 15.—Rained all day, so did not move out. Caught some very good whitefish and salmon trout. River seems to be teeming with them, also with jackfish and goldeyes.

Sunday, September 16.—Weather clear and cool.

Monday, September 17.—Weather clear and still cool, but no frost. Shot a timber wolf, and saw some lynx and beaver work on the river. Moose and bear very plentiful.

Tuesday, September 18.—Reached lower end of Wekusko lake. Weather cool and cloudy. Saw a bear. Moose and fish plentiful. Saw two beaver houses on bank of river.

Wednesday, September 19.—Weather clear and cold. Crossed Wekusko lake in forenoon and camped below Reed lake. Saw more indications of iron on river to-day and am of opinion that there will be iron found in this part of the country.

Thursday, September 20.—Made nine portages in forenoon below Reed lake.

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Crossed lake in the afternoon, reaching the portage between Reed lake and Methy lake in the evening. This portage is six miles long so expect hard work to-morrow.

Friday, September 21.—Rained during the night, and at times to-day. Got our outfit and canoe over portage and camped on Methy lake. Land light and sandy and of little value for farming purposes. Timber largely jackpine and tamarack of small size. A small part of it suitable for railway ties.

Shores of Methy lake low and rocky, with white quartz showing in places on south side of lake. Saw a black bear and many signs of moose.

Saturday, September 22.—Crossed File lake in forenoon and camped on File river below Loonhead lake. There is more muskeg here than on Grass river. Small scrubby mixed timber is seen which, with the exception of a bunch of spruce at lower end of Loonhead lake is of very little value. Of this there may be five hundred thousand feet. The trees are of small milling size, averaging twelve to fourteen inches in diameter. Country back from river has been burned at the same time as country near Grass river. Fish seem to be abundant in File and Loonhead lakes. Weather fine but cool. Leaves falling fast.

Sunday, September 23.—Weather fine and cool. Fish plentiful in river near camp.

Low land seems to be muskeg and high land seems to be rocky at this point.

Monday, September 24.—Wet and foggy to-day. Camped on File river above Burntwood lake. Country on this river low and muskeg in some places and rough and rocky in others, with a small percentage of fairly good land in small patches. Saw no timber of any value and do not consider this part of the country as good as country around Grass river. Fish are very plentiful, but moose, bear and other animals seem to be scarce, and all the country that I have been able to walk through has been burned, with exception of spots near lakes and rivers where fire was stopped by water.

Tuesday, September 25.—Ran down File river this forenoon, but Indian guide has not been on File river previous to this. This river has many channels, and is rather baffling in some places, and as much time is likely to be lost in finding our way, I think it best to return up river from here and explore country along the upper Grass and Goose rivers to Cumberland lake. Camped on river below Loonhead lake. Weather fine in forenoon but bad thunder storm in afternoon.

Wednesday, September 26.—Reached Methy lake to-day. On way up saw no timber of any value except that already described at Loonhead lake and very little good land. Weather fine, with high wind on File lake. Very rough crossing the lake but no accident.

Thursday, September 27.—Weather fine, with wind still high. Reached the long portage in forenoon, crossed and camped on Reed lake. Moose tracks very plentiful.

Friday, September 28.—Fine weather, wind still high. Crossed west end of Reed lake in forenoon and ran up Grass river about half way to Elbow lake. Good spruce and poplar timber above Reed lake near river. Trees of good size. About two million feet can be got here, balance of country burned.

Some small spots of good land but country generally rough and rocky, with some muskeg.

Saw a little white quartz to-day, but not as plentiful as at Wekusko lake. Made three portages over small rapids. Fish very plentiful.

Saturday, September 29.—Weather fine. Heavy frost in morning and cold all day. Saw some good spruce on river to-day, but only about two hundred thousand feet. Country back from water is burned and green timber only along lakes and rivers. Country to-day rougher with high hills on both sides of river below Elbow lake, very rocky with soil nearly all burned off, leaving rocks bare in many places.

White quartz cropping out again along the river below Elbow lake and also on lake in considerable quantities. What I saw does not impress me as being rich, but there is a wide field here for prospecting. Crossed Elbow lake about noon and camped on river below Cranberry lake.

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Moose, bear and other animals not as plentiful as on the lower Grass river. Country between Elbow lake and Cranberry lake largely muskeg.

Fish very plentiful all the way up this river.

Sunday, September 30.—Cold and windy. Leaves all off trees, and it begins to look like winter. Caught some very nice lake trout near camp.

Monday, October 1.—Rain and fog. Camped on Cranberry lake. Saw some fairly good spruce timber along lower end of this lake in bunches of one hundred thousand feet. Think there would be one million feet in all. Country rough and very rocky. A few small pieces of good land and some muskeg.

Saw one moose. Many moose and bear tracks near lake.

Tuesday, October 2.—Rained all day. Did not move camp. The worst storm of trip.

Wednesday, October 3.—Still raining with high wind. Still in camp here.

Thursday, October 4.—Snowing to-day, quite hard, but not cold. Camped about half way up lake. Saw very little timber or good land, and country burned as before.

Friday, October 5.—Snow fell in forenoon and rain in afternoon. Ground covered with snow in morning, but gone by evening. Reached portage between Cranberry lake and Athapapuskow lake in the evening. Country rough and rocky with poor growth of scrubby timber of little value. Some muskegs near upper end of lake and some small hay meadows.

Moose and bear tracks plentiful. Fish in abundance.

Saturday, October 6.—Rain in forenoon; bright afternoon. Crossed portage one and one-half miles into Athapapuskow lake in the morning and reached Goose river, about five miles on Athapapuskow lake, by noon. Saw some small bunches of spruce near portage on Athapapuskow lake, also on Goose river, but only in very small quantities, as this country has been burned as before described. Made six short portages in afternoon and camped on Goose river above Goose lake.

Whitefish are so plentiful in this river that they can be killed in any number with sticks. The water is very shallow in places, being only six inches to one foot in depth, and the fish seem to cover the bottom. I think this must be their spawning ground.

Some fairly good land on lower part of river to-day in small parcels, but country generally rough and rocky.

Moose and bear signs not as plentiful as on Cranberry lake. Quite cold this evening.

Sunday, October 7.—Cold in night and early morning, but began to rain about 10 a.m. There was ice on water along river banks in morning and ice on water pails about three-quarters of an inch in thickness. This was the first really cold night of season.

Fish are continually playing up and down river in front of camp to-day.

Monday, October 8.—Snow and very high wind. Camped near lower end of Goose lake. Country about upper end of Goose lake low and boggy and of very little use. Saw some small bunches of spruce and poplar near north side of lake, but only in small quantities. Limestone on south side and west end of this lake. Bulk of country burned. Fish plentiful.

Tuesday, October 9.—Very cold. Ice on water along shore of lake and snow on ground. Warmer in afternoon. Crossed end of Goose lake in the morning and ran down Goose and Sturgeon rivers to Cumberland lake, reaching lake in the evening. Quite a large tract of fairly good land along Goose river below Goose lake, and also on Sturgeon river between the mouth of Goose river and Cumberland lake. Soil is a clay loam mixed with a little sand. This land has brush and small trees, mostly poplar, but would not be hard to clear. Have seen no open prairie north of the Saskatchewan.

There seems to be limestone on Cumberland lake in considerable quantities, but banks of lake are not high, being in most places not even twenty-five feet above high

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water and in some places are quite low. The limestone in this part of the country may be of great value in time.

Wednesday, October 10.—Cold in morning, wind blowing a hurricane from west until noon, when it calmed a little so we could venture out on lake. We ran down to lower narrows, reaching there in the evening. Weather fine.

Thursday, October 11.—Fine and warm. Reached Cumberland House at noon and ran down the Saskatchewan in afternoon on way to The Pas. Camped about twelve miles below Cumberland.

Friday, October 12.—Fine and warm. Made good run. Camped ten miles below the 'barriers' on river. Saw three moose crossing river. Bear and fox seem plentiful.

Saturday, October 13.—Clear and cold. Reached The Pas in evening. Water very low, which makes travelling very slow.

Sunday, October 14.—Cool and cloudy with slight rain in the evening.

Monday, October 15.—Cold and windy. Raining in afternoon. Disposed of nearly all my outfit in forenoon and started at 3.30 p.m. to walk out to Etoimami, ninety miles along the right of way of Canadian Northern railway carrying provisions for three days, but have neither blankets nor tents. Camped in open about six miles from The Pas. Weather cleared up in the evening and we spent fairly good night. Country here low and largely muskeg. Walking very bad.

Tuesday, October 16.—Cloudy but dry. Made twenty miles. Road very wet and country nearly all muskeg. Camped in the open again. Weather cold, but dry. Had a good night.

Wednesday, October 17.—Cloudy again, but cool and dry. Made about twenty-five miles. Country still muskeg and wet in places. Camped in open again.

Thursday, October 18.—Country low and wet in forenoon, but getting better in afternoon. Saw some good spruce near track, also poplar. Camped in open about eighteen miles from Etoimami.

Friday, October 19.—Weather fine. Reached Etoimami at 2 p.m.

Saturday, October 20.—Left Etoimami at 4 a.m. and reached Prince Albert at 2 p.m. No train till Monday.

Sunday, October 21.—In Prince Albert.

Monday, October 22.—Left Prince Albert on morning train and on reaching Warman found westbound train eighteen hours late.

Tuesday, October 23.—Reached Strathcona in evening.

In conclusion I would say that for the amount of territory travelled over, I think this is the best sportsman's country in the world to-day. Good time can be made travelling with a canoe on all the waters I was on. Game and fish are abundant everywhere. During the trip I saw ten moose, six bear, one deer, one timber wolf, over a dozen lynx, quite a number of mink and other fur-bearing animals, and ducks and geese innumerable. This should become a great tourist resort when better known.

As a farming country: the summer seems to be good, and where good land is found there should be no trouble in raising good crops of all the hardy grains and vegetables, but the greatest drawback to farming would be the difficulty of making wagon roads from place to place, as the country between the spots of good land is rough and rocky.

As a lumber country: the fires seem to have burned over nearly all the country, and I was not able to walk far enough into the interior to find any land not burned. From the information I gathered from Indians and trappers, I would conclude that this burned land reached from Grass river to Burntwood river with the exception of small areas along the lakes and rivers. There is a growth of young timber coming up since the fire which may be of value in time.

As a fishing country, it is good. The fishing industry should be good as soon as a railway is built, as there are immense waters teeming with fish.

As a mineral country I would say that there is a wide field for prospectors. In the country I travelled over I saw indications of gold, silver, iron and limestone. Indians and white men from the north tell wonderful stories about a place called Indian lake, north of Nelson House, also about an island on Burntwood river, where

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minerals of different kinds and oil are said to exist. About the route of the railway to Hudson bay I would say that preliminary survey is already run from The Pas to the southeast of Reed lake and my observations would lead me to think that this is the best route that could be followed to that point. From there on, I think the road should cross Grass river between Reed lake and Wekusko lake, and down the north side of Grass river and Setting lake, passing north of Paint lake. This route would take the railway through the best part of the country where there would be the most local traffic.

I might say that in travelling in that part of this country I have found the Indians very trustworthy and reliable, and have found the Hudson's Bay Company's officials, also Revillon's traders, to be very obliging and willing to give information and help in every way. Had it not been so, I could not have travelled as far as I did in the limited time at my disposal, having travelled at least eleven hundred miles by canoe, made eighty-three portages, and spent a considerable part of my time travelling on foot. We had no accidents, no sickness and very little lost time, except in Cumberland and The Pas waiting for a guide.

I sold the outfit at The Pas, getting thirty-four dollars for the rifle, eleven dollars and fifty cents for the shot gun and five dollars for the compass, but the other things, including the canoe, which was somewhat damaged, I sold cheaper and the bark canoe was left at Reed lake.

I have the honour to be, sir,
Your obedient servant,

J. W. McLAGGAN.

APPENDIX No. 30.

REPORT OF GEO. McMILLAN, D.L.S.

INSPECTION OF SURVEY CONTRACTS IN CENTRAL ALBERTA.

OTTAWA, March 1, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on the examination of surveys in the Edmonton district during the season of 1906 under instructions from you dated May 11, 1906.

After having collected what information I could with reference to the contracts, I left Ottawa on May 15, and arrived in Edmonton on the 19th. I at once called upon Mr. P. R. A. Belanger, D.L.S., as instructed, and proceeded to outfit. On May 29, I left Edmonton for contract No. 15, of 1905, and on the way made a traverse of part of Batty lake. This journey involved a trip of one hundred and thirty miles, of which the last twenty miles of trail were abominable. The townships in this contract (townships 59, 60, 61, 62, 63, and 64, range 12, and townships 58, 61, 62, 63 and 64, range 11, west of the fourth meridian) are almost entirely wooded with poplar. Townships 63, ranges 11 and 12, are traversed by Beaver and Little Beaver rivers, which come together in section 20, township 63, range 12. On Beaver river there are several rapids and considerable water-power might be developed. There are no settlers as far as I have seen, although the soil is of a good quality and will be suitable for farming as soon as the timber is cleared off. On the return trip I made a traverse of part of the Upper Mann lake and arrived back in Edmonton on July 12.

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On July 14, I proceeded to contract No. 12 (townships 59, ranges 1, 2 and 3, township 60, range 1, west of the fifth meridian, and townships 59 and 60, range 27, west of the fourth meridian) and reached there on the 19th. I spent six days in the examination thereof, the weather being most unfavourable. In these townships many families were settled, a majority or all of whom had squatted and during my stay there land seekers were swarming into the vicinity. The soil is suitable for farming purposes, and the water supply is abundant, the townships being traversed by Paddle and Pembina rivers. There are some patches of large timber, but a large percentage of these townships is covered with small poplar and willow scrub.

I next proceeded to contracts Nos. 19, 17 and 20 and examined them in succession. Contract No. 19 is composed of townships 54, 55 and 56, range 6; contract No. 17, of townships 54, 55 and 56, range 7, townships 53 and 54, range 8, and township 53, range 9; and contract No. 20, of townships 55, 56 and 57, range 8, all west of the fifth meridian. The old pack trail leading from Lake St. Ann northwestward has recently been cut into a wagon road and a ferry established across the narrows of lake St. Ann. These townships are largely wooded and very densely so in the vicinity of Pembina river. Seams of coal crop out in several places along the Pembina, and as far as I have seen remain undeveloped. In contract No. 19 there are many large hay meadows, but not much prairie. Contract No. 20 has been burnt over in large sections and a luxurious growth of grass appears among the dead timber and scrub. Contracts 19 and 20 are, I think, specially suited to farming and stock-raising. This completed my examination of the 1905 contracts, and I returned to Lake St. Ann, arriving there on August 28.

According to instructions I next proceeded to townships 60, ranges 3 and 4, west of the fifth meridian, being part of contract No. 15, of 1906. A large percentage of these townships has been burnt over and has grown up with small poplars and willow scrub; the soil is of a good quality. There are small berths of spruce timber of considerable importance in both these townships. There are some settlers in township 60, range 3.

I next visited the adjacent contract, No. 20, composed of townships 56, 57, 58 and 59, range 4, west of the fifth meridian. Townships 58 and 59 are especially suited to stock raising and in the vicinity of Paddle river large herds of cattle are reared. Township 57 is traversed by Pembina river, and is largely covered with timber and heavy windfalls, the south and eastern part being largely swamps and muskeg including a valuable berth of spruce timber. Township 56 is very rolling and better suited to stock raising than farming. Townships 56 and 57 are traversed by a wagon trail leading from Lac la Nonne northwesterly and known as the Grand Trunk trail.

I examined township 57, range 5, west of the fifth meridian, of contract 16. This township, as far as I have seen, is suitable for farming and stock raising, the timber being light except in the close vicinity of Pembina river. There is good grazing even in the woods, and several quarters have been squatted upon.

I next visited contracts Nos. 1 and 21. Contract No. 1 is composed of townships 49 and 50, range 6, and contract No. 21, of townships 54 and 55, range 7, townships 50 and 51, range 6 and township 50, range 5, all west of the fifth meridian. They are traversed by Saskatchewan river and the part north of the river being fairly good soil is somewhat settled. South of the river the soil is light and includes a timber limit. Lumbering is pursued there. There are large deposits of beautiful sandstone on the Saskatchewan and some quarries have been surveyed. I completed this work on November 12 and left for Edmonton, arriving there on November 16. On November 14 and 15 there was a heavy snowfall, which necessitated a change in my transport. I stored the wheeled rigs and bought two sleighs. I also received one heavy horse and a set of double harness from Mr. G. J. Lonergan, D.L.S. I arranged for the keeping of five horses till I should return, and left for township 58, range 21 and township 59, range 20, west of the fourth meridian.

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Both of these townships are as yet but sparsely settled. They are well wooded and the soil is good. In township 59, range 20 there are some fine hay meadows. I next proceeded to townships 61, ranges 25, 26 and 27. The soil in ranges 25 and 26 is of a light nature but both contain some valuable spruce timber. In section 19, township 61, range 25 there is a sawmill which is of great service to settlers in the adjoining townships. The soil in township 61, range 27, is good, and large quantities of hay can be procured in the vicinity of Pembina river. My last work was the examination of townships 58 and 59, range 27, being part of contract No. 14. These townships have become well settled. They comprise a good farming district. In section 5, township 59, range 26 there is a large sawmill in operation.

This concluded my work for the season, the winter being somewhat severe and the snow quite deep, horses would be unable to continue without shelter. I wired for instructions and disposed of the outfit accordingly. I reached Ottawa on January 24, 1907.

I have the honour to be, sir,
Your obedient servant,

GEO. McMILLAN, *D.L.S.*

APPENDIX No. 31.

REPORT OF C. F. MILES, *D.L.S.*

SURVEYS AND RESURVEYS IN SOUTHERN ALBERTA.

TORONTO, January 31, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit my general report on last season's (1906) operations in southwestern Alberta under your instructions, dated April 18, June 7, 18 and 22, and August 25, 1906.

I left Toronto April 28, arriving at Calgary May 2 ; I had previously sent my cook and another man to Macleod to collect my outfit stored at Stavely and Nanton. It was the 5th before I could obtain my outfit from the railway company, and having to repair my wagons, it was the 9th when I pulled out for township 21, range 27, west of the fifth meridian. Two of my men with a wagon load of supplies went by trail to High River to await my arrival there.

Commencing work on the morning of May 10, I measured the north boundary of section 19 to the northeast corner of this section, where no trace of a monument was found ; it had fallen into a ravine and been washed away. I then continued this line east along the north boundary of section 20, to the northeast corner of this section. I retraced the lines of the east boundary of section 19 and east boundary of the southeast quarter of section 30, thus obtaining the intersection of the two lines for establishing the northeast corner of section 19. After traversing the south side of Bow river in section 29 and also the island, or what would be an island in high water, I had the necessary data for calculating the required areas.

After completing this work I left here on the 14th for High River, but finding that one of my mares had been kicked so severely, that she could not move a step, I ex-

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changed her for another horse with Mr. Robert Begg of Dunbow, paying him fifteen dollars on the deal. I have since heard that the mare (Jessie) is still lame.

We left High River on the following day for township 18, range 3, west of the 5th meridian, but owing to continuous rain and snow storms we did not reach there until the 18th. From the following day on there was snow and rain daily up to May 30, preventing me from putting in more than four full days of field work. I completed the survey of this township north of Highwood river by tieing in with the survey of the south side of the river.

Owing to continuous rains the river could not be forded. I therefore moved north into township 19, range 3, west of the fifth meridian (all my work from May 15 lies west of the 5th meridian). I found four settlers in the part of the township that I surveyed. On the west side, the township is very hilly; on the east side, too, there is a range of hills. A surveyed trail traverses sections 1, 12, 14 and 23, but we found it impassable, for in the two latter sections it passes through continuous swamps. The proper place for this trail to be located is along the ridge through sections 13 and 24, which sections the present travelled trail traverses. The part of this township, within the limits of my survey, is principally adapted for grazing. The remaining part of the township appears to be more wooded and also more hilly. Cattle appear to thrive, owing to the luxuriant growth of grass and plentiful supply of water. It is doubtful, however, if any crops could be raised here for though the soil is all that could be desired, the climatic conditions are not favourable for the ripening of grain. Potatoes and the more hardy vegetables have been grown successfully in the eastern sections, but a crop cannot be depended on at all seasons. This statement holds good in respect to nearly all townships that have come under my observation within the third range. From township 19, I moved into township 20 in the same range, where I completed the subdivision in the northerly part. It is mostly hilly and rolling with valleys running between the ridges; the soil is good and there was some grain growing here in the easterly part of the township but not on a large scale, most of it being cut for green feed.

I have seen some fine vegetables that were grown in the northeasterly quarter of this township. There is a good deal of brush and some poplar and spruce on the northern exposure of the hills. After finishing the work here we moved to township 18, south of Highwood river, where I re-ran the east boundaries of sections 20, 27 and 26, and the north boundary of section 21, tieing in with the survey lines from the north of the river. This portion is also hilly and brushy and although the soil is good it is adapted only to stock raising. I then moved camp to section 2, where I surveyed the east boundaries of sections 2 and 11 and sections 6 and 7 over high rolling and hilly prairie. This is a fine grazing country and well watered by springs. While here, I received your instructions, dated June 18, and proceeded with four of my party to the north boundary of township 19, range 3. There I retraced the north boundaries of sections 33, 34, 35 and 36, made monuments at the northeast corners of sections 34 and 35 and re-established the east boundary of the northeast quarter of section 34, also the east boundary of section 3 in township 20.

I rejoined my party July 5, who in the meantime had moved to section 3 in township 17, where they had been compelled to stop running the lines owing to an accident to the instrument. Here we surveyed the east boundaries of sections 3 and 10, 4 and 9, 5 and 8, also the north boundaries of sections 9, 10 and 11. These consist of rolling prairie, with some brush more particularly on sections 5 and 8. In the vicinity of Pekisko creek along the south boundary of this township there is quite a fringe of large poplar and balm of Gilead. This district appears to be given up entirely to ranching, for which, to judge by the vegetation it is admirably adapted. As most of these lands are stated to be under lease and no new settlers may be expected to enter, the pasturage privileges can more conveniently be regulated and in accordance with the requirements of those specially interested. The soil consists of a good depth of black loam underlaid with clay in the bottom lands and with gravel and shale on the highlands.

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On July 9 we pulled out for the southeast corner of township 15, range 2. After cutting out the jog, 9 chains and 20 links, we planted a flag to line in with the east, and then moved on to the southwest quarter of section 1, township 15, range 1, through a very hilly country and over a rough trail, causing the upset of a wagon in a creek. Having to use this trail again on various occasions, I had it repaired, entailing two men's work for a day. The following day I located the southeast corner of township 15, range 1, on the fifth meridian and cut out this line south for about a mile in order to turn off the angle for the south boundary. I completed the subdivision of this township by running the east boundaries of sections 3 and 10, 4 and 9, 5 and 8, and 6 and 7, over very hilly country, covered in part with a dense growth of willow and second growth poplar. There is some spruce in this district but most of it has been cut for a portable sawmill, that has been operating just south of the south boundary of section 1. There are six settlers within the limits of my survey, five of whom made out statutory declarations, the sixth, on an odd-numbered section, the southwest quarter section 1, being absent. They are all new arrivals, occupied in ranching on a small scale. They are also growing vegetables, but most of their potatoes had the tops frozen on the morning of August 4.

I omitted to mention in the proper place that on June 18, in compliance with your instructions, I tied in the old surveyed trail in township 20, range 3, with the interior surveyed lines.

On July 18, I found it necessary to dismiss four of my men, who proved most inefficient and whose services I was glad to dispense with. I paid them off according to their signed agreements and sent them in to Nanton, the nearest railway station. Their places were filled a few days later by a better class of men, for three of whom I had to send to Calgary, men being very scarce on account of general haying operations then in progress.

On July 23 I moved to the northwest quarter of section 6, in township 15, range 1, from where I finished the subdivision and also subdivided part of township 15 in range 2. In locating the southeast corner of township 15, range 2, and the northeast corner of township 14, range 2, there was a surplus of 3 chains and 2 links. Later I found that the east boundary of the latter township was deficient in measurement. The soil in township 15, range 2 is black loam with clay subsoil, covered to a considerable extent with willows, scrub and poplars, mostly second growth. There are no settlers, but the locality is overrun with cattle owned by ranchers in adjacent townships. The country is very hilly and therefore not specially adapted for farming, even if the climatic conditions were favourable, which is extremely doubtful. Much of this township I learn is under lease, or has been purchased by ranchers, who make no effort to cultivate the soil.

On August 6, I moved camp to section 28 in township 14, range 2, surveyed the north boundary and then ran a trial line from summit to summit, without much cutting, along the east boundaries of sections 4 to 33, closing on the north boundary of the township, when I discovered that an error existed somewhere, which I finally located in the south boundary of the township as already explained in my letter to you of September 27 last. There are only three settlers in this township, all of whom are engaged in stock-raising, for which this township is particularly suitable. No cultivation of any kind has been attempted here, and although the soil in the valleys is very good, I am led to believe that the crops will not ripen. It is traversed by high and more or less wooded ridges. Between the ridges there is good grazing and large quantities of hay is cut annually in the valleys. There is a good supply of water in the creeks. Willow creek from 50 to 100 links wide and about one foot deep, meanders all through sections 29, 28, 27, 26 and 25, and another one, Rice creek, a tributary to Willow creek, runs through sections 10, 15, 22, 23 and 26. This creek is so named, not because wild rice is found along its banks, but after a settler of that name, since departed. Other numerous springs have their sources in the ridges already referred to and another creek takes its rise on section 12, running easterly into Willow creek.

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Most of the available timber on the ridges has already been cut by the neighbouring settlers and ranchers. Therefore, but a small quantity is available, indeed barely sufficient for others that may settle here.

On August 28 I received your telegram instructing me to proceed to the fourth base line across the Livingstone range and valley; believing it to be urgent, I broke camp on the 30th, and moved to section 7, township 13, range 2, as far as I could travel with wagons. While some of my party were looking for the line, the north boundary of township 12, range 2, I drove with a couple of men to the east boundary of section 36, township 13, range 2, to check an observation, in which I succeeded. On my return to camp no monuments had yet been discovered. On the fourth base finally a wooden post in mound was found at the north east corner of section 35, township 12, range 2, and we afterwards found a picket lying on the ground at a pile of stones on a high ridge about a mile west. From here we traced the base line (instrumentally) to the wooden post and mound at the northeast corner of section 13, township 12, range 3. It was found in a dense poplar bush, apparently grown up since the first surveys, but all traces of a line were completely obliterated. There we had to pack the outfit with horses, running west about two miles, having previously attempted an observation of Polaris, which proved only partially successful. At the above corner I laid off the prescribed deflection angle, having a back sight of about two miles. Then not being able to get nearer to the work, I moved around to the Indian pack trail by way of section 25, township 13, range 2. In order to facilitate the move, I secured the services of a young man who had previously acted as guide for other parties. We followed the pack trail about half way across the Livingstone range, then left it to strike south over a stony and rocky divide and succeeded in making camp in the valley of a creek running west to Livingstone river and about one mile from the base line. This line crosses one high ridge after another alternating with deep ravines, containing springs and creeks, and all solid timber consisting of spruce, banksian pine and some poplar. The former two attain a diameter of as much as thirty inches and should become of considerable commercial value if the valley of Livingstone river is ever tapped by a railway, which I heard reported was likely to be the case in the early future. There is also said to be coal in the neighbourhood. Different varieties of trout are found in the river, some of those seen by me measuring nearly two feet in length. The open stretches along the valley do not appear of any great extent, the bottom lands being generally more or less bushy and sometimes swampy. The valley proper is not wide, varying from 10 to 40 chains in width. An old north and south survey line was found a few chains west of the river with, at the northern extremity, a four-inch squared post (lying on the ground) marked 'T. B. 600.' Nothing else showed what it delimited, but it presumably marked the northeast corner of a mining location. Owing to unpropitious weather, I secured no satisfactory observation of Polaris, and though I succeeded in obtaining a single view of the star several times, the sky immediately afterwards became obscured, it now being the time for arrival of the early September snowstorm. I did not delay longer than absolutely necessary, fearing I should be snowed in with but a scanty supply of provisions.

Several deer were observed from the pack trail as we were going and returning, and there were also signs of mountain sheep and goat as well as grouse and partridge. Some partly opened stretches were observed along creek bottoms running west into Livingstone river. The river varies from one to two chains in width with an average depth of not much over a foot and is very rapid. I extended my line into the thick woods one mile into range 4, at the terminus of which I considered that I had fully traversed the valley of Livingstone river. A few miles down the valley, my guide informed me that a settler was located and engaged in ranching.

Having completed this survey I recrossed the Livingstone range and returned to township 14, range 2. I finished the subdivision of this township, and also resurveyed a portion of township 13 in the same range. A number of settlers had crowded into the last named township and had made many improve-

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ments on lands now said to be leasehold. They state they settled here in good faith, acting on the advice of some land agent, either with or without authority, and believing that this land was opened for settlement. The settler naturally concluding that he had the right on his side, continues in possession, where in the end, after a few months or perhaps a year, he unwillingly realizes that he has no claim or anyway that the ranchers claim is a preferred one. Then, after the loss of his time, his money and hay and his improvements, which latter may consist of house, barn, fencing, &c., he is compelled to abandon all and start afresh in search of another homestead. The rancher may be within his legal rights but if such be the case, the settler should not have been advised to settle or permitted to remain. Very few of the ranchers held leases but enjoyed all the benefits of occupation of large tracts of pasture land with a free run of the same and without expense, but as soon as the settler ventures to locate, the rancher applies for a lease and then, the unfortunate settler, poor as he frequently is, has had his labours and his outlay in vain.

On October 14 we again broke up camp and started for High River. In passing I rechaind the east boundaries of sections 2 and 11, 10 and 3, in township 15, range 1. At High River wagons were repaired, horses shod and a new stock of supplies laid in, after which, passing through Okotoks and Millarville by good trails, we reached township 21, range 4. Here we searched for monuments on the north boundary of this township and found a W. P. in mound at the northeast corner of section 32. Thence cutting out the line east and west wherever bush, we found the other monuments. I commenced the subdivision of township 21, range 4, on October 6. The lines previously run in this township were obliterated and had therefore to be opened out anew as they were mostly covered with willow and second growth poplar. There is some good timber here still standing although some of it was cut years ago when a sawmill was brought in and operated on the northwest quarter of section 10. A good sized creek runs southeasterly through sections 30, 29, 20, 21, 16, 10, 11 and 12. There are flats along the creek bottom but these are mostly covered with willow and willow scrub. Good spruce and banksian pine are found in different parts, the heaviest growing along the north boundary near Whiskey creek. This creek is said to have derived its name from several illicit stills which at one time were in active operation along its banks. Bunches of spruce and banksian pine (generally called jackpine here) are found on sections 7 and 8, 16 and 17, 19, 20 and 21, 28 and 29, 32, 33 and 34, 22 and 24. These sections it might be advisable to set apart as timber berths.

The principal timber and larger areas are found in sections 28, 29, 32 and 33. This timber is somewhat difficult of access, but it could be got out by a winter road running southerly along the Morley Indian pack trail; also by way of the valley of Whiskey creek along which a good winter road might be constructed down to the south fork of Fish creek. This township is not adapted for general farming. It is very hilly and its only value at present lies in its timber and its being suitable to a limited extent for grazing purposes. Many horses and cattle roam here. The grass lands have the appearance of being overstocked, the pasture being very bare in places. There is one settler in an adjoining township who is said to be possessed of a herd of 3,000 head of cattle, who seeing the necessity of retrenchment disposed last fall of 600 head. Another settler also in an adjoining township has 600 head of horses besides some cattle and they all have the run of this township where there are no fences as yet to stop them from roaming.

In order to complete the subdivision of the northerly part of this township I moved around to the southwest quarter of section 36, quite a long detour, it taking me a day to make the move with my outfit. It had been my intention to move up the Morley pack trail which is quite swampy in places, but going down along Fish creek over frozen muskegs, the trail proved so exceedingly rough that I broke an axle of one of my wagons. The roads in the township are mere winter trails and passable only with sleighs and when there is good snow on the ground. A well graded wagon road leads both from Millarville and Priddis to the sawmill that is at present operat-

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ing on section 25. Much of the timber on this section has already been cut, but there is some good timber still standing in section 24. After surveying the north boundary of this township I borrowed a sleigh and moved my outfit on November 22 along an old tote road to the south fork of Fish creek near a settler on the southwest quarter of section 22, in range 4.

While here I was approached by an engineer asking employment as assistant. He claimed to have been in foreign service for many years and more recently had been running an instrument on the Canadian Pacific railway's irrigation ditch east of Bow river. On the strength of this application I wrote you my letter of November 12, receiving your reply dated the 22nd favourable to my suggestion. I then sent one of my men (an Indian) on the 25th to Morley from where he returned on the following evening with two more Indians. The same day my prospective assistant arrived at my camp and I found he could not qualify nor could I accede to his stipulations. I had now more men than the allowance called for, but I concluded to keep them on for a short time to further the work in this township, and I may here state that better men in a brush township than I had secured in the Stony Indians could not be desired. They are excellent ax or brush-hook men, very willing and good at keeping line. I never tried them at mounding. They may possibly not be quite so efficient with the spade or pick.

This township is very hilly and brushy. The greater part is covered with willows, poplars and spruce and more or less scrubby in the valleys. There is good grazing whenever there are openings and it is well watered. The south fork of Fish creek meanders through sections 18, 17, 21, 22, 15, 14, 11 and 12. There is a number of small springs tributary to it. It averages about twenty-five links in width and about twelve inches in depth. There are some good meadows along the creek, though much of the bottom lands are covered with willows and scrub; but for this it would make an ideal grazing country. There is a settler on the southwest quarter of section 14 who raises only horses, and another settler in the adjoining township east has a cow-camp on the northeast quarter of section 18, where his improvements consist of a log house about 15 x 20, a log stable about 18 x 35 and some fencing. He has a large quantity of hay cut in the valley which he feeds to his cows and calves in winter. No attempt at cultivation has been made, the valley not being adapted for raising crops except oats for green feed and possibly a few hardy vegetables. Wherever there are openings there is a luxuriant growth of grass which makes this township more particularly adapted for stock grazing.

All the townships within the limits of my last season's survey may be classified as grazing country.

In most portions of the district traversed, that is in the wooded country, there is an abundance of game. The deer are of the white-tailed variety. The wooded townships are the chief hunting grounds of the Stony Indians. A number of these visited my camp in township 22, range 3, with the hindquarters of four deer just killed. These, however, I did not buy, having at the time all the provisions necessary. These Indians were members of a large band spending their time hunting and killing deer wholesale. Unless some restrictions are imposed controlling this indiscriminate slaughter, it will not be long before the deer in this region are exterminated. In respect to fish, I should mention that nearly all the streams are well stocked. The principal variety being mountain trout, speckled trout, bull trout and grayling. There are also considerable numbers of mountain grouse and partridge, and in certain localities a few prairie chicken. While subdividing this last township, although the weather was very fine, the frost was severe, having penetrated into the ground the full depth of the pits, and I was compelled to abandon the mounding. The Indians also were anxious to return to the reservation before Christmas, and as the one month of two of them was up, I allowed them to leave on the 19th. After they had departed, I rounded up the work and broke up camp on December 20, paying off some of the men on the 21st. Those that took charge of the horses and outfit that had to be

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taken into wintering quarters, on December 24, were given checks for the several amounts due them.

I had previously made arrangements with Mr. Howe, near Priddis, who also has the winter cow-camps on section 18, in township 22, in range 4, for the wintering of my outfit.

I left Calgary on December 21, arriving home on the 25th.

I have the honour to be, sir,

Your obedient servant,

C. F. MILES, *D.L.S.*

APPENDIX No. 32.

REPORT OF A. D. MOODIE.

EXPLORATION OF THE COUNTRY BETWEEN ERWOOD, SASKATCHEWAN, AND THE PAS, KEEWATIN.

LAKEFIELD, ONT., November 30, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—I have the honour to report that having received instructions on July 31 from your department to proceed to Prince Albert and there await further orders, I arrived at that point on Wednesday, August 1.

On August 6 I received my instructions, which were to organize a party for the purpose of exploring the region lying between Erwood, on the Canadian Northern railway, and The Pas, on Saskatchewan river.

I had considerable difficulty in procuring men and horses for the expedition, as well as a guide familiar with the country which I was to explore. There were no horses to be obtained in Prince Albert or on the Indian reserves in the immediate vicinity, and I was compelled to send to Duck Lake, forty miles distant, in order to procure them. I deemed it advisable to purchase six animals as we would be obliged to make up light packs, owing to the muskeggy nature of the country we had to traverse. I paid eighty dollars for one animal, eighty-five dollars a piece for three others and ninety dollars a piece for the remaining two. I also purchased a second-hand stock saddle for use in case of any emergency.

My instructions from your department left me a certain degree of latitude as to what route I should adopt, and as I had been unable to secure a guide in Prince Albert, but had heard of one living about twenty-five miles north of Tisdale named Thomas Ballantyne, I decided to go that way and interview him. We therefore shipped our heavier supplies by the Canadian Northern railway to Erwood, and proceeded with light packs across country to Mr. Ballantyne's homestead. I was successful in engaging his services, and found his knowledge of the district of the greatest value to me throughout my work.

It took us eight days to journey from Prince Albert to the Canadian Northern railway right-of-way, and as we had about ten days' provisions in hand on our arrival I decided to explore a certain portion of country before going into Erwood for the balance of our supplies.

The part that I explored first was that section lying between Leaf lake, on the east, and the Canadian Northern railway right-of-way on the west. Our work carried us as far north as the north end of Leaf lake and south to the main line of the Canadian Northern railway. My investigation of this section proved that it is mostly unfitted for agricultural purposes, mossy muskegs sparsely clothed with spruce and

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tamarack scrub, and gravel ridges covered with spruce and light poplar being the prevailing features.

The poplar is suitable for pulpwood, and amounts to about three million feet. It is practically of no use for any other purpose, the best of it being only about eight inches in diameter. Tamarack and small spruce amount to about one million feet. Spruce suitable for lumbering purposes grows in scattered quantities. It would be a generous estimate to assert that there are four million feet within this particular area.

Moose, caribou and bear are very numerous. We did not see many of the smaller fur-bearing animals, but I was assured by the trappers and Indians whom I encountered that they are very abundant.

The quality of hay in the marshes is distinctly poor. It is what is known as muskeg hay. Judging from the dislike of our horses to it, it is unsuitable for animals of a domestic breed. The only pasture for which our horses showed any partiality at all was the goose grass which grows in scanty patches on the gravel ridges already referred to.

Small streams are plentiful throughout this section, but as the land is low and of a marshy nature it would be impossible to erect dams on any of them for industrial purposes. They are, moreover, narrow, shallow, and full of rapids. Leaf lake is the largest body of water in this vicinity, with the exception of Red Deer lake, which, however, did not come within the scope of my investigations. It is a fine sheet of water, being about the size of a township in extent. On the northern and western sides, it is bounded by vast muskegs, but on the east and south the timber, the quality of which I have already stated, runs almost to the water's edge. Its waters are shallow, having an average depth of about eight feet. The lake contains a moderate supply of pike and sucker. On finishing this portion of my work, I decided to go to Etoimami, striking in by the well known pack trail that runs from Etoimami to The Pas.

Etoimami is eight and a half miles from Erwood, and we brought in our supplies from the latter point by means of our pack horses. We arrived in Etoimami on August 29, and having obtained our supplies, gave our horses a day's rest before setting out on the second portion of our expedition. Our supplies proving too bulky for our animals, I engaged a team which was travelling the same way as ourselves to cart six hundred weight of the goods as far as 'Thirty Mile Store.'

On September 1, we set out for 'Thirty Mile Store,' on the Canadian Northern route, my object being to first explore the country lying to the north of that point. My reason for doing so was that the season was well advanced, and there was danger of seriously damaging the horses' feet if frost settled on the muskegs. We arrived at 'Thirty Mile Store' late in the evening of September 2, and here I met Mr. Stewart, the leader of the companion exploring party, who was utilizing this point as his base of supplies. Prior to starting out in earnest on my work, however, I made a preliminary exploration of the ridges to discover if it was at all feasible to take horses through that country. Our guide had informed me that it was quite possible to do so, but I found that the off-take ditches of the Canadian Northern railway, while they had drained the western portion of the country, had flooded the eastern, and it was only when we arrived at Little Pasquia river that I found it possible to make use of our animals. I had been obliged to leave behind me at 'Thirty Mile Store' a man in charge of two of our horses, which were suffering from sore backs. In order to get our horses to Little Pasquia river we were compelled to make a succession of corduroy roads across the muskegs, which proved a laborious and lengthy undertaking. This work, combined with the exploration of the intervening tract of country, took us eighteen days to accomplish.

We started on our return journey from Little Pasquia river on the morning of September 21, but encountering an open muskeg, over which it was impossible to take the horses, and being, moreover, short of provisions, we cached our packs and left the

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animals to pasture on a ridge about eight miles from the station. By doing so we were enabled to reach 'Thirty Mile Store' at 5.30 p.m. the same evening. On the following morning September 22, I sent the men back to bring in the horses. To accomplish this they were obliged to make a long detour with the animals around the muskeg, an undertaking which occupied them three days.

Having spent a day in repairing pack saddles, &c., we started out from 'Thirty-Mile Store' on September 26, with our full complement of men, animals and supplies. My destination was Little Pasquia river, where I intended to form my base of supplies, as I had discovered that that was the only point from which that part of the country could be suitably explored. I found a convenient base eighteen miles a little north of east of 'Thirty Mile Store,' and having cached our goods proceeded with my work of exploration.

The region is very similar in its characteristics to that we first explored, but the muskegs are more dangerous, whilst the timber is entirely of a scrub quality, being composed of dwarf spruce and tamarack.

Being shorthanded on account of the nature of the country, I took the opportunity on September 28 of hiring two Indians whom I found hunting in the neighbourhood. I paid them at the rate of two dollars per day for their services. On October 11 I despatched two of my regular party back to 'Thirty Mile Store' in charge of the horses instructing them to remain there till my return, and proceeded to explore the district on foot. The horses had been most serviceable as far as seven miles east of 'Fifty Mile Store,' but on reaching this point the dangerous quality of the muskegs, combined with the advent of frost rendered it hazardous to employ them any longer.

I concluded the exploration of this portion of my territory and returned to 'Thirty Mile Store' on October 18. On October 17 I had paid the two Indians their wages, the sum total amounting to eighty dollars. When I arrived at 'Thirty Mile Store' I received a letter from Mr. Stewart, informing me that he had brought from Erwood, a registered letter from the department to myself, and had left it in charge of a local merchant in Etoimami. I set out next morning for Etoimami and obtained the letter which contained a cheque for three hundred dollars, and which in order to have cashed I was obliged to transmit to Prince Albert.

The general character of the country from the north end of Leaf lake to The Pas and as far as thirty miles east of the grade which is already constructed to the latter point, is very similar in its features to that of which I have already informed you in this report. The timber however, is of somewhat better quality, and in greater quantity, one ridge alone which lies about half way between 'Thirty Mile Store' and Little Pasquia river, containing about two million five hundred thousand feet of spruce, suitable for lumber. There is, in addition on the same ridge, about three million feet of white and black poplar, and one million feet of tamarack suitable for ties and telephone poles. The average measurement of the spruce is about twelve inches, of the poplar seven inches, and of the tamarack nine inches. One particular spruce which I measured was one hundred and three feet in height and nine feet two inches in circumference.

It would be well to state here that what I have denominated 'ridges' throughout this report are in reality only slight elevations of from six to ten feet above the muskeg. There are only seven important ones in the whole region that we traversed, and these are from two to three miles long and about a mile wide on the widest part. There are also five smaller ridges which contain a certain amount of timber suitable for lumber, pulpwood and ties. The timber is composed of spruce, tamarack, white and black poplar and white birch.

Following are the dimensions and amounts of the timber on each ridge:—

Ridge No. 1.—Spruce suitable for lumber, diameter, ten inches; amount, eight hundred thousand feet. Tamarack suitable for ties, and piles, diameter seven inches; amount, one hundred thousand feet. Poplar suitable for pulpwood and building purposes, diameter, six inches; amount, five hundred thousand feet.

Ridge No. 2.—Spruce suitable for lumber, diameter, nine inches; amount, four hundred thousand feet. Tamarack suitable for ties and piles, diameter, nine inches;

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amount, fifty thousand feet. Poplar suitable for pulpwood and building purposes, diameter, seven inches; amount, five hundred thousand feet.

Ridge No. 3.—Spruce suitable for lumber, diameter, twelve inches; amount, two million feet. Tamarack, suitable for ties and piles, diameter seven inches; amount, fifty thousand feet. Poplar suitable for pulpwood and building purposes, diameter, six inches; amount, fifty thousand feet.

Ridge No. 4.—Spruce suitable for lumber, diameter, twelve inches; amount, two million five hundred thousand feet. Tamarack suitable for ties and piles, diameter seven inches; amount three hundred thousand feet. Poplar suitable for pulpwood and building purposes, diameter, eight inches; amount one million feet.

Ridge No. 5.—Spruce suitable for lumber, diameter, ten inches; amount, twenty thousand feet. Tamarack suitable for ties and piles, diameter, eight inches; amount, fifty thousand feet. Poplar suitable for pulpwood and building purposes, diameter, nine inches; amount, forty thousand feet.

For the convenience of your department I have marked these ridges on the sketch map of the district, bracketing under each ridge the amount of timber contained on each.

The land like the first section that I explored is utterly unsuited for agricultural purposes. Muskegs, either of an open nature, or covered with three or four feet of moss form the prevailing feature. Scrub spruce and tamarack abound throughout it.

Small lakes, partaking more of the nature of sloughs are very numerous; they contain no fish and the water in them is somewhat stagnant. Of streams, there are four between 'Twenty Mile' and 'Thirty Mile Stores.' Three of these rise in the Pasquia hills, two of them forming the head waters of Little Pasquia river. None of these streams are serviceable for lumbering or navigation as they are crooked, shallow and full of rapids. Their depth in summer runs from eighteen inches to two feet. The banks are alternately high and low, sometimes rising as high as three feet above and at others sinking almost to a level with the water. All these streams flow to the east, the average rate of their currents being about two and one-half miles an hour. Their width from bank to bank is at the most sixteen feet. The beds are a mixture of shale and gravel.

What timber there is, in the district, lies within easy access of the railroad, none of it being more than ten miles distant from the Hudson Bay railway. Owing, however, to the impossibility of driving the logs down the waterways, which in addition to their shallowness, flow the wrong way for the purposes of transportation, it would be necessary to draw the logs out in winter, unless the alternative plan was adopted of erecting a portable mill on the limits and thus saving the carrying of much waste material to the railway.

Little Pasquia river is the most important river in this section. In summer, like all the other streams it is very shallow and crooked. Rapids are numerous and the current very swift. It is, however, perfectly suitable for lumbering purposes, as in the spring of the year the water is amply deep enough for driving timber. The rapidity with which the river fills up may be judged from the fact that after a heavy rainfall in September, its depth increased twenty-two inches, with the result that a large portion of the country around its mouth was badly flooded. The width of the river is about forty feet. Dams cannot be erected anywhere along its course owing to the lowness of its banks.

The quality and quantity of the timber which adorns both banks of Little Pasquia river constitute its most important features. Whilst there are only two narrow fringes of timber varying in width from one hundred to two hundred feet, these extend from twenty-five to thirty miles up both sides of the stream and contain altogether about five million feet of good marketable spruce, tamarack, and poplar. The tamarack in comparison with the other woods, is scattered, but all the timber is of excellent quality

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and not to be excelled in any other part of this region. The spruce averages from ten to twelve inches in diameter, the tamarack about eight inches, and the poplar about the same. In one particular spot on the east side of the river there is a large patch of white poplar, covering an area of nearly four square miles which is really of magnificent quality. The timber along both banks of Little Pasquia river is very scattered, which will account for the small estimate I have placed on that particular area. The tamarack is mostly suitable for ties with a six inch face, or for piles. I estimate its amount at two hundred thousand feet. In addition there are about one million feet of poplar, suitable for pulpwood or for building purposes. On the west side of Little Pasquia river I discovered that a large section of land had been burned over, utterly destroying all the timber that had been upon it. There is along both banks, however, a considerable quantity of fallen timber, which is dry and sound and admirably fitted for firewood.

The country lying to the east and north of Little Pasquia is composed entirely of muskeg and is covered with spruce and tamarack scrub. There are no open muskegs and the only place where hay can be obtained is on either bank within a short distance of the river. The character of the country can be best judged from the fact that for days together we were compelled to wade in water to our knees. A unique feature of all the region that I traversed is that good timber is to be found only on ridges such as I have already mentioned. In this particular section there are no ridges whatever.

There are one or two small and insignificant lakes which scarcely merit mention. The streams which run into Little Pasquia river from the east are shallow, crooked and narrow, and are merely so many rivulets taking off the surplus water of the muskegs.

The same species of game which I have mentioned as abounding in the other sections are also to be found here in large numbers. Otter and mink haunt all the streams.

The nature of the climate is hard to determine as I was, of course, only in the country during the summer months. I noted, however, that there was an exceptionally heavy rainfall. The heat was intense during August and September, but there was hardly a night during the entire period that we did not experience a few degrees of frost. After a heavy rainfall, about August 20, there was a frost so severe that it froze the edges of the lakes and streams. By the end of September the grass on the muskegs was frozen so badly that it was neither palatable nor nutritious for our animals.

It was not included in my instructions to make any report on the village of The Pas. For the information of your department, however, I made inquiries of Mr. Edwards, who is in charge of the Church of England mission at that point, and gleaned from him the following facts regarding it. The population is about five hundred, including Indians. Most of the inhabitants are members of the Church of England. The village consists of a few half-breed houses, two stores and the Church of England mission. The church is a frame building and holds a congregation of one hundred and fifty. There is a resident doctor.

The Canadian Northern railway to Hudson bay runs through a muskeg country nearly the whole way from Etoimami to The Pas, a distance of eighty-nine miles. The engineers discovered that the muskeg of this particular section rested on a solid foundation of limestone gravel from between three to six feet below the surface and they claim that once the muskeg is drained a good roadbed will be obtained. I need not, therefore, dwell on the desirability of any other route for the Hudson Bay railway.

I am glad to report, in regard to the health of my party that not half an hour's illness was experienced by any one of us during the entire trip.

We were unfortunate enough to lose one of our horses during the early part of our work. The hard travelling and scarcity of feed being apparently the cause of its death.

We concluded our work on October 26, having worked back from Little Pasquia river to Etoimami. We were compelled to wait at Etoimami till Tuesday, October

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30, owing to the lack of a car for our horses. On October 30, I shipped the horses in charge of one of my men to Prince Albert, the rest of us following by the first passenger train early on Thursday morning. We arrived in Prince Albert on the same evening. I paid one man off on Saturday, November 3, as soon as I received a telegram from your department to disband the party, but kept one on to take charge of the horses till the sale which took place on Monday, November 5. Under separate covers I have forwarded the bill of sale of our horses and outfit together with a statement of my accounts. I have also forwarded a copy of my diary covering the whole of our itinerary.

Trusting that the report will meet with your approval.

I have the honour to be, sir,

Your obedient servant,

A. D. MOODIE.

APPENDIX No. 33.

REPORT OF W. F. O'HARA, D.L.S.

SURVEYS AND RESURVEYS IN CENTRAL AND SOUTHERN ALBERTA.

OTTAWA, ONT., March 25, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour in accordance with my instructions, to submit the following general report upon my surveys of the season of 1906.

I left Ottawa early in the month of May, for the province of Alberta, taking the main line of the Canadian Pacific railway.

On May 12 I arrived at Calgary where I remained for a day or two, purchasing part of my outfit, and hiring part of my party. I then proceeded by rail to Lacombe where I hired the rest of my party, and completed the purchase of my outfit and supplies.

Until May 15 little or no rain fell, and the whole country was as dry as match wood. Many farmers were fearing a dry year, which would have been very disastrous to the country, but on the morning of the 15th rain began, and the sun was scarcely seen until the 31st, when the weather cleared. The wind blew from the northeast during that period, which is the rainy quarter in the province of Alberta. The whole country was flooded and the roads were impassable for some time.

In consequence of the state of the roads, I chartered a car from the railway company to move my outfit and supplies, from Lacombe to Nevis, about forty miles east. By this means I was enabled to get within about twenty miles of the scene of my field operations. The roads and trails at this distance from the railway were in much better condition than those nearer the settlements, and were passable. I then proceeded southerly by the roads and trails, to township 34, range 21, west of the fourth meridian, where I commenced my season's work. It consisted in this locality of correction surveys, which were not originally executed with the degree of precision required by the department.

I arrived here on June 6, and remained until September 17, making the necessary corrections in townships 32, 33, 34 and 35, range 21, and townships 32, 33 and 34, range 22, all west of the fourth meridian.

The land in this region consists of black loam from two to six inches deep, with a clay subsoil, and is well adapted for farming.

I then proceeded to Cygnet lake, about eight or ten miles west of Red Deer, in

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township 38, range 28, west of the fourth meridian, and township 38, range 1, west of the fifth meridian, the latter line passing nearly through the centre of the lake. I made a complete traverse of this body of water, also of the old shore line, the waters having receded, and produced the subdivision lines of the townships across those portions of the lake which had dried up. This work was required in consequence of applications having been made for lands, which the latest plans showed were entirely covered with water. This is a well timbered region, with poplar up to twelve inches in diameter. The soil consists of rich black loam from six to twelve inches, with a clay subsoil. The country is well settled, and the land is nearly all taken up and improved. The farmers all seem to be in a prosperous condition, judging from their fine buildings, good crops and large herds of cattle. I completed everything that was required here on October 8, and left for Red Deer on the 9th, arriving there about noon of the same day. On the 12th, I chartered a car from the Canadian Pacific railway, and shipped my entire outfit to Macleod, in the southern part of Alberta, arriving there on the 13th. On the 16th, I drove to Pincher Creek, a small town about twenty-seven miles southwest of Macleod.

I spent a day in reorganizing and purchasing supplies, and left on October 18, arriving at township 5, range 3, west of the fifth meridian, about four o'clock in the afternoon of the same day. On the day following fourteen inches of snow fell, the first severe storm of the season in this part of the province. My work consisted here of the subdivision of the township. The weather was so severe and storms so frequent, that I succeeded in surveying only a few miles. The country is heavily timbered with fir, pine and spruce, and differences of altitude of from 1,000 to 2,500 feet make surveying operations not only difficult but exceedingly slow. There is evidence of the presence of coal and petroleum in this township; operations for the latter are now in progress. I remained here until November 28, and returned to Pincher Creek upon that date. I discharged my party, sold my outfit, and returned to Ottawa, arriving here on December 5.

I have the honour to be, sir,

Your obedient servant,

W. F. O'HARA, *D.L.S.*

APPENDIX No. 34.

REPORT OF A. W. PONTON, *D.L.S.*

SURVEYS IN NORTHERN ALBERTA.

MACLEOD, ALBERTA, November 3, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my survey of block outlines and base lines in the Lac LaBiche and Athabaska districts, under your instructions of November 20, 1905.

Leaving Macleod on January 6, 1906, I proceeded to Edmonton, where a party was organized, supplies and outfit purchased, and arrangements made to have outfit and supplies freighted to Lac LaBiche. My transport equipment, turned over to me by Mr. P. R. A. Belanger, inspector of surveys, consisted of one team of fair sized horses, and ten pack ponies, with proper equipment of saddles, &c.

Starting from Edmonton on January 13, I reached Duck lake near the point where my work commenced on the 21st. Owing to lack of good sleighing, it was found

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necessary to follow the ice road on the Saskatchewan to a point fifteen miles below Victoria, and from there to strike the Lac LaBiche road at Redclay creek.

Work was commenced on January 23, and until May 21, when I closed on the fifth meridian, weather conditions proved favourable, and no untoward circumstances occurred to interrupt the ordinary daily routine,—consequently good progress was made.

Owing to the light snow fall, and a period of intense cold which occurred in the early winter, frost penetrated the ground to an unusual depth for wooded country, and it was soon discovered that mounding could be done only at excessive cost and would also delay the projection of lines. I therefore decided to leave the mounding until the projection of lines was completed, and then, with a reduced party, mound back to my starting point. This plan was also rendered necessary by the small number of pack-ponies at my disposal being inadequate for the transportation of a party of the usual number of men. As it turned out this plan proved in the end the best that could have been followed, the mounds being constructed at less cost, and more strictly in accordance with regulations than would have been possible with frost in the ground.

Mounding back commenced on May 22, and the starting point of my survey, at the northeast corner of township 64, range 13, west of the fourth meridian, was reached on June 18. Between June 19 and 25 I returned by way of Victoria to Edmonton, where my party was paid off, and all government property in my possession handed over to Mr. P. R. A. Belanger, inspector of surveys.

Following is a description of the country through which I passed :—

The country in the neighbourhood of Lac LaBiche is generally wooded, poplar being found on the high land, and spruce in the swamps. The spruce timber available is sufficient to supply all lumber required for early settlement, but is too scattered for commercial purposes. A portable sawmill would best meet local requirements. The soil is generally a good clay loam, which becomes lighter and more of a sandy loam, as the lake shore is approached. Cut banks were observed at different points on the lake shore, showing clay loam forty feet in depth without stone. Small scattered areas have been partly cleared by fire, and these clearings will eventually facilitate settlement. Country of this description has been much favoured by Russian and other foreign settlers during recent years. Whitefish and ground game will provide the poorer class of settlers with a plentiful supply of food during the initial period of making a farm. Lac LaBiche as seen during the winter months is impressive, and its attractiveness during the summer must eventually lead to its becoming a popular pleasure resort.

The country lying between the lake and the fifth meridian is not attractive, and settlement will be slow. Lac LaBiche river offers some good land along its banks, but as it is not navigable, access is difficult.

(Note.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 46.)

No trace of minerals of economic value were observed in the country passed over and rock in place seems entirely absent. Game, while not numerous, is still sufficient to assist the Indian and half-breed hunters through the winter. Lynx, as well as rabbits, were especially numerous. Partridge and prairie chicken were seldom seen. Between the Athabaska river and the fifth meridian signs of moose were very frequent, and for the past several years they have been numerous in the vicinity. No water-powers were observed, but Lac LaBiche river might furnish power if the water supply is sufficient at all seasons.

The winter climate in the neighbourhood of Lac LaBiche and Athabaska Landing appears to be similar to Edmonton, and although periods of low temperature occur, their duration seldom extends beyond a week. Good dry wood fuel abounds and cold weather causes little inconvenience to residents or travellers.

I have the honour to be, sir,

Your obedient servant,

A. W. PONTON, *D.L.S.*

APPENDIX No. 35.

REPORT OF W. R. REILLY, D.L.S.

RESURVEYS IN SASKATCHEWAN.

REGINA, SASK., February 27, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—I have the honour to submit the following general report concerning my survey operations in the field from May 21, 1906, until February 5, 1907, according to your instructions dated at Ottawa, April 21, 1906, and subsequent instructions.

Your instructions were for me to take the transport outfit stored with Mr. Chas. H. Seymour near Saskatoon. On receiving your instructions I wrote Mr. Seymour in reference to the condition of the horses and other information about the outfit. I did not get an answer to my letter (which was some months after, returned to me through the dead letter office). After waiting several days I sent a man to Saskatoon to look up the outfit but no trace of Mr. Seymour could be found until I wired you and got the location of Mr. Seymour's homestead which was over thirty miles from Saskatoon.

I wired the man I had sent to Saskatoon to hire a livery and drive out after the outfit. On receiving word that they had arrived in Saskatoon, I left Regina on May 21. On the following day I organized my party and procured my supplies in Saskatoon.

The work throughout the season was either retracements or resurveys of townships that had been surveyed in the early eighties and have been reported on by the surveyor of each township. At the time of the original surveys the land was in the virgin state and far removed from the likelihood of immediate settlement. Its productiveness was then conjectured not demonstrated. It did not then present to the surveyor the same appearance as it now would, for settlement has changed the blank aspect of the country and cultivation has shown that excellent crops can be grown in favourable seasons, not only on first-class land but on ground that has been considered to be low grade.

As the country becomes more thickly settled the tendency is to take up the poorer class of homesteads. This is not often done by parties who pretend to make homes of them, but more by those who have purchased adjoining land, by whom a quarter is considered poor indeed if it is not worth homesteading.

The horses had wintered fairly well, but they were not in a condition to stand much driving until they had improved. So I decided to spare them, and began work in township 35, range 6, west of the third meridian, the nearest work to Saskatoon. In this township I could do but little driving on account of the river and scrub on the lines. By the time I had completed the township the horses were in good condition.

I moved into this township on May 23. The weather then was warm and bright, grass growing rapidly, trees budding, seeding well advanced, trails in good condition and the country presenting a fine appearance for the season.

I made a retracement and restoration survey of the outlines and interior meridians of this township, and a traverse of South Saskatchewan river in the southeast quarter of the township, which cuts sections 4, 3, 2, 10, 11, 12 and 1.

I found the majority of the old markings but many of the iron section corner posts were missing, and those found were in bad condition and not fit to be used. The wooden posts in the quarter section corners were nearly all destroyed. Mounds in most cases were unmistakable when found, but owing to the uneven surface of the ground, scrub on the lines and all traces of old lines being blotted out by fires and new growth, it was only by re-running the lines that a large number of these could be found. In the retracement of lines in this township and all retracements during

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the season's work, I resorted to random lines as being the most practical and expeditious way of carrying on the work.

The surface soil and general character of this township is varied. The southeast and northeast corners of the township are broken by the south branch of Saskatchewan river, which enters in and runs through sections 3, 10, 11, 1 and out in section 12, entering in again and running through section 36.

The east part of the township is flat, the west part from rolling to hilly, the division is marked by a range of hills skirting the flat from the southeast corner of section 5 to the northwest corner of section 35. Moon lake, a shallow body of fresh water, cuts sections 10, 14, 15, 16, 21, 22 and 23. It has low marshy shores with reeds extending far out into the water. It is considerably higher than the river into which it could be easily drained.

Generally speaking, a large portion of the southeast quarter of the township and the sections along the river are covered with a dense growth of red willow, poplar and balm of Gilead. The willow is large enough for fence posts, the poplar and balm of Gilead for fuel and rough buildings. The remainder of the township is dotted more or less with clumps of poplar and brush, but in few cases is there anything larger than six to eight inches in diameter. The soil of the flats is mostly a good clay loam. The upland in the northwest quarter of the township is a good sand loam running into light sand in the southwest quarter.

Nearly all the homesteads in the north half of the township are taken up, and some odd quarters have been bought up in the flats. It is but recently that the land has been settled on, but excellent progress has been made. Crops were looking well and gave promise of a good harvest. The greater part of the land is best adapted to mixed farming. The southwest quarter of the township is light, but excellent for grazing. Frequent rains occurred during the survey and the climate was all that could be desired.

I finished the survey of the lines on June 26 and started for townships 33 and 34, ranges 1 and 2, west of the third meridian, a block of four prairie townships.

I crossed the river at Saskatoon, where half a day was spent in procuring supplies and ferrying across the river. I arrived in township 34, range 2, at noon on June 28.

My instructions were to make a retracement and restoration survey of these townships. This work I proceeded with in township 34, range 2, until July 6. The original subdivision was very poor, consequently lines were very crooked and distances unequal. A local improvement district had been formed out of these four townships. It seems that for some time previous to the beginning of the survey the matter of a correction survey for these townships had been discussed in council and throughout the district. So when it was found that I was not making a new survey, only establishing old corners, general dissatisfaction seemed to prevail. A meeting of the council was called and you were wired concerning the disapproval of the survey. I wired you briefly the situation and received conditional instructions to make a resurvey of these townships, particulars of which have been sent to you in subsequent correspondence.

I made a retracement of the east boundary of townships 33 and 34, range 1, the east boundary of township 33, range 3, the north boundary of township 32, ranges 1 and 2, and a resurvey of all other outlines, interior meridians and cross lines in these four townships, destroying all old monuments. A traverse was made of all water areas. Many minor changes were made in the positions of the monuments and some gross errors corrected, the greatest being in township 33, range 2, where all the monuments (south of the lake in sections 19 and 20) on the east boundaries of sections 6, 7, 18 and 19 were over 13 chains in error. The positions of all old monuments are marked in the field notes, which will give in detail the changes made at every corner.

The general features of each township are similar. The surface is prairie, mostly rolling, parts hilly, all more or less cut with small lakes, ponds and grass sloughs, the

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water mostly alkaline. Excellent well water is got in many places by digging from 20 to 30 feet. The soil is generally a light clay loam running into sand loam in many places, and mostly alkaline in the low ground.

The district is new, being settled only about three years, but it has all the appearances of a much older settled country in regard to cultivation. A large amount of breaking has been done and considerable land is under crop, mostly wheat with a large proportion of oats and a small amount of barley. All presented an excellent appearance while growing and promised a large yield per acre. Some slight damage was done by hail. Hay is not plentiful, but a considerable quantity can be cut around many of the sloughs and in some places on the upland.

The surveyed line of the Grand Trunk Pacific railway running westward, enters township 33, range 1, at the quarter on the east boundary of section 36, crossing township 34, range 1, diagonally in a straight line, which is continued into section 33, township 34, range 2, where a slight deflection is made to the south. It leaves this township in the southwest quarter of section 31. A side track has been laid out on section 28, where a station is likely to be built. The building of this road has added fresh impetus to the district. Land has advanced rapidly and a large number of good buildings have been built this season. A number of good school houses, which are also used for church purposes, were built before I began the survey, township 34, range 2, having two, township 33, range 2, having one, and township 33, range 1, having two. There is a nice small Roman Catholic church in township 34, range 1.

The season for farming was exceptional, with abundance of rain, which produced both crops and grass, with no frost, much sunshine, little damage by hail and fair harvest weather. From present indications grain growing will for some time be the chief industry, but the district is well adapted for mixed farming, as grain, cattle, hogs and horses, all do exceptionally well. Such class of farming is the best kind of insurance against the uncertainties of farming in this country.

In the retracement of the base lines across ranges 1 and 2 and the third meridian on the east boundaries of townships 33 and 34, I found the lines straight and the chaining excellent, especially on the base where our chaining scarcely varied a link to the mile. This is so different from the subdivision work done in these townships that it shows that not even ordinary care was taken with the work.

On August 25 I finished the traverse of lakes in township 34, range 2, which completed the survey in this district. On the same day I received your instructions dated August 16 to examine and report on the necessity of a survey of township 34, range 6, west of the third meridian. On August 27 I took one man with me and drove into this township by way of Saskatoon and made an examination which was reported to you at the time. In the meantime my outfit moved into township 37, range 1, west of the third meridian.

Township 37, range 1 and townships 38, ranges 1, 2 and 3, west of the third meridian formed the next district surveyed. I made a retracement and restoration survey of the outlines and interior meridians in these four townships, also a traverse of a number of water areas, which differed materially from the original surveys. These townships are open prairie. Many minor errors were found. The survey was perhaps honestly done and was a superior class of work to what was done in townships 33 and 34, ranges 1 and 2. I found nearly all original markings but the majority of them were nearly blotted out. Townships 37 and 38, range 1 and township 38, range 2, were posted with wooden posts which were nearly all destroyed. Township 38, range 3 was posted with iron posts, but few were found.

Township 37, range 1, is very hilly on the south and west sides rolling to hilly on the east and north sides, depressed in the interior and much broken by water areas.

In township 38, range 1, the two tiers of sections on the north side are almost flat, the balance of township is rolling to hilly, with several water areas.

Township 38, range 2 is cut diagonally by a range of hills from section 6 to 36, the northwest part is rolling, the southeast part hilly and stony.

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Township 38, range 3 is rolling and stony in the northwest corner. The greater part of this township, the rolling and the flat land in townships 38, ranges 1 and 2 and a number of quarter sections in township 37, range 1, are first-class farming lands. The soil is either a rich sand or clay loam and produces good crops. The soil of the hilly ground is good but it is best adapted for grazing. Where it is stony, it is fitted for little else. Water is plentiful, mostly fresh. Hay is rather scarce but a limited quantity can be cut in each township.

The main line of the Canadian Northern railway just skirts the north boundary of township 38. The town of Vonda is in range 1, Aberdeen in range 3, with elevators at each place. The settlement is new but developing fast. Wheat is the principal crop.

I finished the survey of these townships on October 16. The mounders had several lines to do, so I put all hands at mounding and I took advantage of the time to investigate an error on the east boundary of section 34, township 31, range 9, west of the third meridian, according to your instructions dated August 27. The particulars have been reported to you. The mounding was finished the day I returned to camp, October 23.

On the following day I started north for the next work in townships 41 and 42, ranges 27 and 28 west of the second meridian, camping on the ground in township 41, range 28, on the 25th.

I made a retracement and restoration survey of the outlines and interior meridians in townships 41 and 42, range 28, and a retracement of the outlines and interior meridians in townships 41 and 42, range 27. The mounding of these two townships as before reported is not done.

These townships are much different from the prairie country to the south. The surface is from rolling to hilly more or less broken by hills and water areas and dotted with clumps or large stretches of poplar. Water is plentiful but more or less alkaline. The soil is very good in the greater part of the township. With very few exceptions this district is settled with Galicians. Nearly every homestead has been taken up in these townships and more or less improved. A number have quite large areas in crop and threshed a thousand bushels of wheat this season. The settlement is new but good progress is being made. The dwellings put up by these people are substantial and warm. They are built of logs, one story high, with thatched roof; the walls are plastered over inside and out with clay and then whitewashed. A flour mill and store in township 42, range 26, is more or less patronized. The greater amount of trading is done in Rosthern, on the Prince Albert branch, and Vonda on the main line of the Canadian Northern railway.

The weather during the progress of the work was fine for the season. The ground froze up about November 20. The first snow of the season, a light flurry, fell on November 1. The snow fall was light until Christmas, when a heavy storm increased the depth to 14 inches.

I finished the work in this district on December 29. On the following Monday I started by way of Vonda, Aberdeen and Saskatoon for township 34, range 6, west of the third meridian, to make a retracement of the lines in this township according to your instructions dated September 13, 1906. Owing to unbroken roads, heavy snow drifts and extremely cold weather it took one week to make the trip and get camped in this township. The outlines on the east and the west sides and the interior meridians next these outlines are on hilly prairie. Heavy snow drifts made it impossible to locate mounds on these lines. The three meridian lines in the centre of the township could not be run with satisfaction except when frozen up. I found original corners from which I located the corners on the north boundary of townships 33 and 34, governing these lines. I surveyed these lines and the cross lines connecting them, planting all quarter and corner posts but no mounds were built. I traversed a body of fresh water in sections 4, 5, 8, 17 and 16, known as Pike lake, also both banks of the river and the islands in it. Extra heavy cutting was done through willow jungles on these lines. All lines not run being on high ground can be run

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best in summer time when markings can be found if they exist. From the many discrepancies shown on the plan and the absence of all markings or old cuttings I do not think these centre lines were run in the original subdivision.

A description is given in the field books for each township surveyed during the season.

Searching for old markings and noting their positions made the work much slower than running original lines. During the season's work seven hundred miles of section lines were run and over one hundred miles of traverse work. Nearly one hundred miles of lines were heavy cutting.

I quit work February 2, arriving in Saskatoon with my party on the 4th. I paid off the men the following day. The horses were let out for winter with Mr. T. W. McNeil, on section 14, township 33, range 6, west of the third meridian. Transport goods were stored with J. F. Cairns, Esq., Saskatoon.

The railroad being blocked, I was delayed in reaching home until Saturday, February 9.

I have the honour to be, sir,

Your obedient servant,

WM. R. REILLY, D.L.S.

APPENDIX No. 36.

REPORT OF J. F. RICHARDS, D.L.S.

SURVEYS IN NORTHEASTERN SASKATCHEWAN AND NORTHWESTERN KEEWATIN.

STE ANNE DE LA POCATIERE, March 18, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of the surveys made by me during the last session at Cumberland House, at The Pas and at Big Eddy, following your instructions (file No. 627210), dated May 11 and those following dated August 3 and 30 last.

I left Ottawa on June 8 for Cumberland House and reached Winnipegosis on the 12th, which place I left the same day by the N.W. Fish company's boat for High Portage on Cedar lake, arriving there on the evening of June 13.

On June 16 I took the *Cumberland*, one of the N.W. Fish company's boats, for Cumberland House, arriving there on June 18.

Cumberland House is situated on Cumberland island, which is a small island near the southeast bank of Cumberland lake, about six miles north of Saskatchewan river.

The commerce of Cumberland, especially in furs, is considerable. The Hudson's Bay company has an important post here, and Revillon & Co., has built and established stores there during the course of the summer. A school and a Catholic chapel are found there. The Catholic church and the residence of the Catholic missionaries are situated at the southeast corner of the Hudson's Bay company's reserve, quite near the south limit of the said reserve.

At about three-quarters of a mile farther on, towards the south, is the Indian reserve on which there is a school and a chapel under the direction of the Rev. Mr. Settee, Anglican missionary.

Cumberland, including the Indian reserve, has about 600 inhabitants, of which two-thirds at least, are of Indian origin. There are only a couple of white families there, the rest being English and French half-breeds, the English half-breeds predominating. The language generally spoken there is Cree, although several of the half-breeds understand English, and six or seven amongst them understand French. These

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half-breeds hunt, fish or work for the companies mentioned above.

In the event of hunting and fishing coming to an end or decreasing sensibly, this population would suffer the greatest privations. The price of merchandise of all kinds is excessively high.

The abuse of alcoholic liquors makes sad ravages here, in spite of the efforts of the Catholic missionaries, and those of other religious denominations who combat this curse.

These half-breeds are generally hospitable, very intelligent, of an independent character, very pacific and very honest, but improvident, troubling little about the future, and living only from day to day. They have a repugnance to ordinary manual labour, especially to agricultural work. They are excellent hunters, good fishers, and good guides. Their power of endurance is remarkable, as shown in the long and difficult trips which they have to take in canoes, on foot or with dogs, according to circumstances.

The land in the neighbourhood of Cumberland House, that of the Hudson's Bay company excepted, is damp, swampy and of little use for farming. The small extent of arable land which is met there is moreover very rocky and very difficult to improve. The inundations of Cumberland lake and of Saskatchewan river are sometimes so great and the country is in general so flat, that cattle raising would have little chance of success.

There are no stone quarries, nor is there any water-power there. There is wood everywhere, chiefly pine and poplar, with some birch, but it is too small for lumbering.

Apart from those made on the Hudson's Bay company's reserve, the clearings are of very little importance. None of the clearings are more than fifteen acres in extent, and not more than one-quarter of this is well cultivated.

The summer is short, but hot, and the vegetation is extraordinarily vigorous and rapid. Potatoes and vegetables of all kinds grow and ripen well. It is claimed that it would be the same for barley, oats and even wheat.

The last frosts come in June and the first in September. Winter commences about November 1, and spring towards April.

Fish abound, especially sturgeon and whitefish. Wild duck and bustard are found most plentifully, but the stag, elk, bear, otter, bison, muskrat and marten all abound.

Almost all the land occupied by the half-breeds is covered with wood, in the midst of which their houses are found here and there and sometimes very near to each other. It took some time to settle the position of the houses and to determine the general arrangement of the lots.

As the original limits of the Hudson's Bay company's reserve have been obliterated or lost, re-establishment has become necessary to settle the front of the half-breeds' lots. The road which I surveyed to lead to the Catholic mission at Bigstone river is not exactly in the same place as that mentioned in the order-in-council accompanying my instructions, because this latter road for the most part, passes on the Hudson's Bay company's reserve.

In order to leave, in as far as possible, the half-breeds or others, in possession of the land which they occupy, I have been obliged to make lots irregular and of different areas.

It was only after several conferences and minute explanations that they understood what it was a question of doing, and that I was able to adopt the method which gave them the most satisfaction. I have settled thirty-seven lots which, except three or four, were already occupied or claimed.

I have retraced the limits of this portion of the Indian reserve granted by the Department of Indian Affairs. The southern boundary of this portion has a length of 80·80 chains. Its western boundary is 78·90 chains. I have taken the bearings of Cumberland lake from the east extremity of the southern boundary of the Indian reserve to the southern boundary of the Hudson's Bay company's reserve, then the bearings of Bigstone river from the western boundary of the Hudson's Bay company's

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reserve to the western boundary of the Indian reserve. The sketch attached shows all the surveys.

I finished the work at Cumberland August 3. On Monday August 6, I left Cumberland for the Pas on one of the Hudson's Bay company's boats, where I arrived in the afternoon of the same day.

On arriving at The Pas I met Mr. Wickham, Mr. Finger's agent, with whom I immediately visited the places to be surveyed, accompanied by Father Boisson, Oblate missionary, and Dr. Larose, as interpreters, and by some of the half-breeds who occupied land adjacent to that which Mr. Finger wished to obtain.

It was decided between Mr. Wickham and myself, that the work of surveying should begin the morning of the next day, but I could not proceed to survey before the 8th, *i.e.*, Wednesday, seeing that the day before Mr. Wickham had not been able, he said, to find any person to help me. The 8th, 9th, 10th and 11th of August were employed in surveying the land of Mr. Finger and the lands of the half-breeds, which were adjacent to his. I was helped by three men only, as Mr. Wickman claimed that he could not find more. Sunday, August 12 I took advantage of a boat which left The Pas for High portage, where we arrived in the afternoon of the 14th, after a very stormy voyage on Cedar lake.

On the evening of August 15 I took one of the Northwest Fish company's boats for Winnipegosis, where we arrived about noon on the 16th. There I found your instructions addressed to me at the post office, dated August 3, ordering me to return to The Pas if I had left there, in order to make a settlement survey at Big eddy. The next day, the 17th, I left Winnipegosis for The Pas, where I arrived on the evening of the 23rd.

On August 25 I met one of the half-breeds from Big eddy named Henry Cook, at The Pas, who had come at my express request to confer with me about the settlement, which could be made at Big eddy. Mr. Cook represented the half-breeds at Big eddy.

The Big eddy settlement is situated to the north of Saskatchewan river on the back line of The Pas Indian reserve. It is therefore separated from Saskatchewan river by the Indian reserve. It is the only place at Big eddy, outside of the Indian reserve, where it is possible to build houses on land which is somewhat dry and beyond the reach of floods. I have surveyed at Big eddy eighteen regular lots each two chains in length and having an area of two acres. Sixteen half-breeds each claim one of these lots. No improvements of any consequence have been made on any of these lots, except on lot 14, where there is the beginning of a house.

I have also taken the bearings of a part of the point named Big eddy point, which is opposite the settlement on the south side of Saskatchewan river. On September 8 in the forenoon, several of the Big eddy half-breeds came to meet me, and again begged urgently for the survey of Big eddy point.

The part of this point comprised between the red line 10 and 14 on the attached sketch and Saskatchewan river is claimed by these half-breeds, that is, they desire to have the use of it gratis, as land for hay. Naturally I have not been able to guarantee them either the ownership or the use with a free title of this point. I have surveyed it so as to make their claims known to the department. Henry Cook and some other half-breeds have already occupied this point. There are still three houses to be seen, which they built formerly there and which they had to abandon a few years ago on account of the floods from Saskatchewan river. They place great hopes in this point and cannot believe that it can be refused them. They also wish to have a free title as proprietors of the settlement lots.

It can be said that there is practically no cultivable land at Big eddy.

The general observations made about Cumberland apply here. However, alcoholic liquors, so en vogue down there are used only very little or not at all here.

I finished the survey of Big eddy on September 19, and went to The Pas the same day, which is four miles to the east. I immediately commenced the survey of the settlement of The Pas.

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The settlement of The Pas is situated on the south bank of Saskatchewan river. It is bounded on the east by that part of the Indian reserve, designated under the name of block B, and on the west by that other part of The Pas Indian reserve, designated under the name of block A.

I made ten lots there. Lots 1 to 6, inclusive are occupied and claimed by the half-breeds. Lots 7 to 10, inclusive, are vacant or rather are those which Mr. Finger could obtain without any person having anything to complain about.

Except a few little pieces here and there on the bank of Saskatchewan river, all these lots are practically unfit for cultivation unless extensive draining operations are carried on. The rest is a plain covered with a bed of moss from twelve to twenty-four inches in depth, appearing to extend towards the south beyond the settlement for some distance. This plain is moreover covered by a black or red pine timber from three to eight inches in diameter.

The half-breeds have made some improvements on their lots, but altogether they have only a very small area on each lot in a state of cultivation or as a garden.

The Pas half-breeds, like those of Big eddy, are almost all of English origin. The language spoken is Cree.

The population of The Pas, counting the Indians of the reserve, is about 500.

The means of subsistence are the same as at Cumberland.

The Pas is the seat of an Indian agency, of which Mr. Fisher has the direction. It is at The Pas that Dr. Larose lives, the physician named by the government for the care of the Indians. There is a school built and maintained by the government for the Indians.

Almost the whole population professes the Anglican religion which has as missionary the Rev. Mr. Edelbard. The Anglican chapel is a good sized building.

One of the branches of the Canadian Northern, a railway which runs towards Hudson bay, ought to reach The Pas during the course of the summer.

The Hudson's Bay company has an important post here under the direction of Mr. Shalcrosse.

I finished the settlement of The Pas on October 12. I next surveyed the lands of the Anglican mission, which I finished on October 23.

At this date the service of the Hudson's Bay company's boats as well as that of the N. W. Fish company had ceased, so it was impossible to return by the water route. I was obliged to wait for the winter roads, and it was not until November 22 that it was possible for me to leave The Pas. I made the distance which separated me from the railroad by a dog train.

I left Winnipeg on December 5, and reached Ottawa on the 8th, and again left on the 11th for Ste. Anne de la Pocatiere.

I contracted la grippe while coming from the Northwest, and after returning to my family I was unable to do any work whatever for over two months. I am now almost well and will finish my returns as soon as possible.

Hoping that you will be satisfied with this report which I respectfully submit to you.

I have the honour to be, sir,

Your obedient servant,

J. F. RICHARD. *D.L.S.*

APPENDIX No. 37.

REPORT OF JOS. E. ROSS, D.L.S.

SURVEYS IN RAILWAY BELT, KAMLOOPS DISTRICT, BRITISH COLUMBIA.

KAMLOOPS, B.C., March 23, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report on my surveys during the past season in the railway belt, British Columbia.

A year ago to-day I began the season's work by making two small surveys along the line of the Canadian Pacific railway, one near Ashcroft, the other opposite Spatsum. At the first place there is a little cultivable bench land which would need to be irrigated. The soil, however, is of such an absorbent nature that when irrigated it has a tendency to cause slides. For this reason I understand the railway company objects to the lands adjacent to the track in this locality being irrigated. It has already been the cause of several very expensive lawsuits in which the company so far has been successful. At Spatsum the land surveyed is adapted only for grazing, being stony, hilly and broken. This land I understand was being taken up or applied for on account of the gypsum deposits on it. Some development work has been done but I did not make any examination of it.

My next work was the subdivision of the range lands on the hills immediately south of Kamloops. These lands are covered by grazing leases. It has been a matter of contention between the lessees and the settlers as to whether the land is fit for general farming or not. The general opinion appears to have been that the land was unsuited for farming otherwise it would have been taken up and settled on many years ago. Some fifty or sixty squatters have located here within the last two years. Time alone can tell how successful they will be. Probably a few will do well while others will abandon it. The conditions have been unfavourable. The last two summers have not only been dry but they have been preceded by winters with a very light snow-fall. Last summer the grasshoppers did considerable damage to the crops. The country is mostly open but there is sufficient fuel for many years. In the gulches and low places there are poplar groves which furnish fencing material. The surface is undulating, gently rolling and hilly. The soil is rather light but fairly good around the base of the hills. The water is mostly alkaline. There are no mountain streams but numerous ponds and small lakes. Water for domestic purposes can generally be obtained by digging. There are also good springs. The altitude is from three thousand to four thousand feet above sea level. There are numerous prospects and mineral claims but so far only one proved to be a mine.

From the Kamloops range I went to Long lake where I subdivided the remaining unsurveyed lands. The character of these lands is precisely similar to those just described. The best of the land was surveyed and settled on quite a few years ago. From here I continued farther south to the belt boundary at Stump lake. I surveyed a few sections here along the boundary and west of the lake. This country is rougher, being rocky and broken and fit only for grazing. Several mineral claims have been located here. There are fairly good wagon roads leading from Kamloops to all the lands surveyed to the south. A climb, however, of about two thousand feet has always to be made.

I next went to the main valley of Sullivan creek on the east side of north Thompson river where I surveyed a few sections along the north limit of the belt and corrected or changed some of the old surveys which had been made before the present bound-

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ary had been decided on. This survey was made chiefly to meet the requirements of settlers who had located here recently. The country here is partly open and partly timbered. The bottom land of which there is but a small quantity has considerable brush on it. The high land requires to be irrigated. There is not sufficient water for this purpose unless the lakes at the head of the creek are drained. All the suitable land for farming has already been taken up. There is a good wagon road from Kamloops by way of Hefferly creek. There is an ascent of about fifteen hundred feet.

From here I came down to north Thompson valley where I spent some considerable time making surveys to fix the location of some old provincial lots so that the areas of the adjoining quarter sections might be found. This kind of survey involves a great deal more work than would be called for in making an original survey. It is often unsatisfactory as the old lines or corners can not be found and much of the work done seems to be to no purpose.

On completing the work here I went to Revelstoke where after making a small survey west of the town I proceeded to connect the right-of-way of the Arrow lake branch of the Canadian Pacific railway with the Dominion section lines. A little delay was occasioned here through not knowing the exact way in which the survey should be made. The weather, too, which had, so far, been fine turned wet and continued so for almost the remainder of the season.

From here I went south to the valley of Incomappleux river. From the boundary of the belt I made a sectional survey about six miles up the river. I also traversed both banks of the river. The valley is about three-quarters of a mile in width and has steep mountains on each side. On the mountain side the timber is medium sized hemlock, cedar and fir. On the higher lands in the valley there is some very large cedar. On the low lands the timber is spruce and cottonwood. The greater part of the valley is fit for settlement, and the climate is not unfavourable. The cost of clearing an acre of the best land would range from one hundred to two hundred dollars. Freshets occur in the river during spring and after a heavy rainfall of several days duration when low lying lands are flooded. The most valuable natural resources of this district are the timber and minerals. The timber is very conveniently situated to the river which is navigable for logs at certain stages of the water. Very rich mineral has been found here but most of the claims are high up on the mountains, and as transportation is by means of pack horses the cost of getting the ore out is too great to permit of the mines being worked at a profit. There are numerous small streams flowing into Incomappleux river, upon each of which there is some available water-power. Goat were seen on the mountain sides and marten, mink and weasel in the valley. The usual route to this district is by way of Revelstoke, thence by the branch line to Arrowhead, thence by steamboat to Beaton or Comaplix, thence by stage to Camborne; from the latter place there is a pack trail up the valley on each side of the river.

On my return to Kamloops I made several small surveys on Shuswap lake (two on Mara lake and one at Cinnemousun narrows). All these lands had been applied for. Years ago it was thought that all the land suitable for settlement in the railway belt had been surveyed and taken up but still the settlers continue to come and squat on land where the prospects of making a good living are not at all promising. I think it is the good climate rather than the land which induces people to come to British Columbia; this is especially the case where people come from the Northwest.

I have the honour to be, sir,

Your obedient servant,

JOS E. ROSS, *D.L.S.*

APPENDIX No. 38.

REPORT OF ARTHUR SAINT CYR, D.L.S.

SURVEYS OF BLOCK OUTLINES IN THE PEACE RIVER DISTRICT.

OTTAWA, March 15, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General.
Ottawa.

SIR,—I have the honour to submit the following general report of my surveys of block outlines in the Peace river district performed under your instructions, dated March 12, 1906.

I left Ottawa on March 13, and five days later arrived in Edmonton, where I stayed just long enough to organize my party, consisting of twelve men, and to arrange their transportation to Lesser Slave lake. The bulk of my supplies and outfit, ordered a month before, had already been shipped to its destination over the winter roads.

On March 23 I started for Athabaska Landing, where we arrived on the 26th. Here sleds were substituted for the wagons, and the next day we continued our trip over Athabaska river towards Lesser Slave lake.

No serious difficulties were met with on Slave river, though we frequently found the ice covered with a foot of water. In such places the ice was unsafe and it necessitated long detours. We pushed on with all diligence, trusting much to luck, but at five miles above Donaldson's ranch, which is at the confluence of the Moose and Slave rivers, the sled carrying my instruments suddenly broke through the ice. This is a particularly bad spot on the river, and is much feared by all freighters. The river here is very deep, and owing to many warm springs the ice is always more or less cut by air holes, and thus made unsafe. The great width of the rack which was bolted to the sleds, and which caught on the edge of the ice, prevented us all from going to the bottom. It also allowed us time to save the instruments and to recover most of the baggage which was afloat. However, we resumed our trip over the ice keeping close to the shore, but a few miles farther on we found the river clear of ice, and so we had to land. Here I got two wagons to take up most of our outfit, and with light loaded sleds we reached Johnny Stony's place on the left bank of the river.

From this point we followed the winter overland trail, which runs across a couple of small lakes and some large swamps. It is the most direct route to the foot of Lesser Slave lake. In crossing the lake we were delayed by having to go around a large opening which generally forms at the lake narrows and which every year causes the loss of the loads and outfits of many freighters.

On April 2 we landed about three miles east of Stony point and reached the trading post of Revillon Bros. at Lesser Slave lake, the same night. Here I arranged with two freighters to take to Snipe lake part of the supplies required for completing the survey of the seventeenth and eighteenth base lines west of the fifth meridian. I had already forwarded baled hay and oats to that point which I intended to make my depot for this survey.

On April 9, having received from Revillon Bros., successors to Bredin & Cornwall, part of Mr. Wallace's packing outfit, which had been stored with them the previous fall, I crossed Buffalo bay and went to camp at Prairie River Settlement. In this vicinity the quality of the soil is all that could be desired for any kind of cultivation. Though recently opened, this section bids fair to become one of the most prosperous in the country. There is already a large acreage under cultivation, and the returns from the tilled land have exceeded all the expectations of the settlers. Moreover, they have no trouble in marketing their produce at high prices. Good hay in unlimited quanti-

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ties can be cut in this vicinity and along the shore of Slave lake, so that it becomes an easy matter for farmers to keep cattle. This country is well watered by numerous running streams. Oats and barley had been successfully grown here for some years, but Mr. O. D. Hill was the first to try growing wheat. The experiment proved successful, and it is expected that wheat growing will become one of the chief occupations of the farmers. Up to the present all the flour used in this district has had to be brought from Edmonton or Morinville at very great expense. This is the land which, in 1905, I recommended to you for immediate survey, and I am glad that it is turning out so well.

A good wagon road connects Prairie River Settlement with that of Lesser Slave lake and also with the trading post and mission at Sturgeon lake which is situated about sixty-five miles to the southwest. On April 11 we left the settlement by the Sturgeon lake winter road, and soon came to an undulating country wooded with poplar, birch and spruce. At noon we forded West Prairie river. During the afternoon we continued our journey through the forest, and at night pitched our tents near a small lake lying about thirteen miles southwest of the settlement. The country around that lake is low and swampy. The next day we crossed the nineteenth base line in township 72, range 17. From there the land gradually rises and the road skirts along the southern slope.

Late in the afternoon we reached the east shore of Snipe lake, 1,800 feet above sea level. Here the freighters were paid off. Some of the men were now instructed to put up the supplies in seventy-five pound packages, while the rest were sent to cut a trail around the lake and build a cache near its south end. In this cache I intended to leave what supplies were not wanted for immediate use, and thus avoid in the future the trip around the north end of this lake.

On April 17 we travelled to the west side of Snipe lake and camped at the intersection of our newly cut pack trail with the Sturgeon lake winter road which is a continuation of the one followed by us since we left the settlement. West of Snipe lake all the timber has been burnt and with very little work the land which is good could be cleared of the willow and poplar scrub with which it is now covered. This flat country extends also north of Snipe lake. There it is covered with small birch and second growth poplar and a few spruce. It is drained by Snipe creek which empties into Little Smoky river less than a mile north of the point where the nineteenth base line intersects that stream. To the south it is bounded by a range of low hills which rise opposite the southern extremity of the lake and extend in a westerly direction. From the west shore of Snipe lake where we had established our depot we continued the work on the trail leading south towards the eighteenth base line, which is twelve miles distant. On April 19 we camped at a creek of running water, one-quarter of a mile east of the northeast corner of section 31, township 68, range 19, west of the fifth meridian, which was the initial point of my survey. The country travelled over between the south extremity of Snipe lake and the eighteenth base line is rolling and the land is timbered with poplar, spruce, balsam, fir and birch from six to twelve inches in diameter. The soil is a black loam from four to six inches deep with a clay subsoil. We crossed numerous small streams all flowing northwesterly, the principal one being Carrot creek which we crossed about four miles north of the line. It flows between high banks and empties into Little Smoky river joining it a mile and a half south of the point where the winter road comes down to the river. From the top of the hill which bounds the valley of Carrot creek on the south the land is flat and is densely wooded with spruce averaging six inches in diameter.

I began the survey of the eighteenth base line at the northeast corner of township 68, range 20. In this range the soil is principally clay with an alluvial deposit of black loam a few inches in depth. The surface is undulating and is timbered throughout with poplar, cottonwood, spruce, balsam, fir and birch. There is also an undergrowth of willow and alder which is very thick in places. All the different kinds of timber are well distributed as to size, running from six to twelve inches in diameter. Many small running streams, tributaries to Carrot creek, drain this part

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of the country. In section 35 we crossed the height of land (2,300 feet above sea level) between Carrot creek and Goose river.

In range 21 the base line crosses Goose river (altitude 1,900 feet above sea level) three times, once in the middle of section 34 and twice at short intervals near the northeast corner of section 33. This stream coming from the southeast flows also into Little Smoky river, joining it about two miles north of its intersection with the base line.

Goose river is two chains wide with banks ten to forty feet high. It flows swiftly over a stony bottom. A well defined pack trail intersecting the north boundary of this township near the northeast corner of section 33 leads to the confluence of Goose river with Little Smoky river. This is a favourite camping ground used by the Indian hunters from Sturgeon lake when journeying to the south on their frequent hunting expeditions.

Little Smoky river (1,700 feet above sea level) is the next and largest stream intersected by this line. It is met first in the middle of section 31 and again close to the northeast corner of township 68, range 22. At this crossing the river is three chains wide with a depth of three feet, at the time of survey. It has a sandy bottom and its banks are thirty feet high. Its valley is about half a mile wide. There is some partly open level land, at intervals along this stream and thin seams of coal were seen along its banks. The east half of this range is wooded with poplar, spruce and birch. The soil is the same as in the preceding range. The west half is in places swampy, and wooded with small spruce.

In range 22 Little Smoky river is crossed for the last time in the middle of section 36. From that point westerly to the northeast corner of township 68, range 23, the ground is gradually rising and undulating. In sections 35 and 34 the land is covered with young poplar and scrub willow and could be easily cleared. Sections 33 and 34 are generally swampy. Then poplar and spruce bush begins and extends to the west limit of this range which is as far as this survey went. The monument marking the northeast corner of township 68, range 23, as established by this survey, was erected. A line was also opened between that post and the one established by a previous survey and its length and bearing were recorded in the notes. The pack trail from lake St. Ann to Sturgeon lake crosses this line close to the northeast corner of township 68, range 23. The general elevation of this part of the country is 2,000 feet above sea level. The soil is good.

I now returned along the eighteenth base completing, on the way, some mounding which had been left undone on account of frost in the ground, and reached again our main cache at the northeast corner of township 68, range 20. From that point a trail had to be opened southerly towards the seventeenth base line, twenty-four miles distant.

The country between these base lines is also thickly wooded with poplar, spruce, cottonwood and birch while jackpine grows on the high land. Its surface is rolling or undulating. On May 21 we moved camp from the cache on the eighteenth base line, and after travelling one and a half miles came to a divide 2,200 feet above the sea. Shortly afterwards we crossed a good sized creek of fresh water, beyond which our trail ran across low and swampy lands, with many small hay meadows, and here I decided to camp over night. These meadows were the only ones noticed that day along the road. On the next day we had better travelling across a dry and park like country, sparsely wooded with small poplar, spruce and some jackpine, all probably of second growth. Then came a two-mile belt of spruce, some of them being fifteen inches in diameter. We were now approaching Goose river, which flows in a depression 200 feet below the general elevation (2,000 above sea level) of the surrounding country. Crossing one more creek we camped about ten chains west of the forks of the river. For a few days previous there had been heavy showers daily, frequently accompanied with hail. I was therefore not much surprised when, on descending towards the valley of this river, I found the ground still covered in spots with an inch or so of hail stones. The river was also so swollen that it was not safe to ford it with loaded

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pack animals. So I went to explore along the river banks for a suitable crossing. Shortly after leaving camp I came to the junction of two streams. The one from the southeast was the widest, but judging from the swiftness of the current it was also much shallower than the other branch, whose water flows through a deep channel cut between high steep banks. This last stream appears to come from the northeast and, according to the report of some Indians, it flows from a lake lying eight or ten miles from the forks. I went along this last stream for some distance, but, finding no fording place, I returned to camp and had a raft built on which we crossed the river and continued the work on the trail, leaving the ferrying of the outfit till the water should have somewhat subsided. For a distance of half a mile from that point we followed along the left bank of the river, which, however, soon got so steep and high that we had again to enter the woods. Here we had to make a detour to the west in order to avoid some muskegs which lie in the vicinity of the river.

Beyond these muskegs we came to sandy ridges wooded with jackpine, with more narrow swamps intervening. Shortly after, however, we struck a better country, with a gradual ascent towards the south. We crossed the summit (2,250 feet above sea level) four miles south of the river. For two miles more the country is nearly level. Then comes a strip of burnt country covered with windfall. These destructive fires were, however prevented from spreading east by extensive swamps and muskegs. From these swamps two good sized creeks rise and flow towards the west, where they eventually join the Iosegun river, which is a tributary to Little Smoky river. At three miles south of the summit we came to Atikkamek ('poisson blanc') creek, another deep stream across which we had to throw a bridge about one mile east of its confluence with Iosegun river. This last part of our journey had been made over very soft ground, which would have been impassable but for the fact that the subsoil was still frozen in many places. Across Atikkamek creek we found the old Lake St. Ann pack trail, which we followed easterly and which led us to the place where Mr. Driscoll had two years before cached his survey posts.

I began the survey of the seventeenth base, which is the north boundary of township 64, at the northeast corner of section 34, in range 19, and produced it westerly for three ranges and a half across a timbered country drained by many streams, chief among which are Little Smoky river and two of its affluents—Iosegun river from the east and Waskahigan river from the west. I believe that these rivers join Little Smoky river from opposite sides within a short distance of each other. Atikkamek creek, which I have already mentioned in describing the country between the seventeenth and the eighteenth bases, is the principal tributary of the Iosegun river. It comes from the northeast and, after intersecting the seventeenth base in range 18, flows along the south side of the line till, in section 34, range 19, it passes again to the north of it, and shortly afterwards joins Iosegun river. This creek rises in the same low country as Goose and West Prairie rivers. Only one lake, three miles long and one mile wide, was seen three-quarters of a mile north of range 20, but in this section, where so many muskegs occur, there are probably many others not seen from the line.

Exploratory trips made to the south of the line showed that the land there is also low and swampy. I was informed by my packers, who followed the pack trail along Iosegun river when going to Sturgeon lake for mail and supplies, that in that direction they found travel most difficult from the same cause. This also coincides with the reports from the Indians, who frequently visit this country on their hunting excursions. Some open prairie patches were seen, but only in occasional flats along Waskahigan river. More prairie land may, however, exist along the lower reach of this stream, whose valley seems to widen as it approaches that of Little Smoky river. The soil in these flats is good, though light. This was the best land and the easiest to clear and cultivate that I had seen since leaving Prairie river settlement. Unfortunately, there is at present no road by which this place could be reached, except the usual Indian pack trail. Large game abounds in this valley, and the trappers and Indian hunters of Sturgeon lake have built here many shanties, where they spend the winter.

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The distance to Sturgeon lake would be about forty miles by the trails. The valley of Waskahigan river has been carefully explored by different railway survey parties. The location of their lines was recorded by my chainmen when we were surveying the north boundaries of the following sections:—

At 57 chs. W. of N.E. Cor. Sec. 32 Tp. 64 Rge. 20 W. of 5th Mer.; bearing N.W. Mag.									
6.73	"	"	36	"	64	"	21	"	north "
50.07	"	"	36	"	64	"	21	"	" "
72.33	"	"	33	"	64	"	21	"	" "
43.05	"	"	34	"	64	"	22	"	" "

These exploratory lines were surveyed across a high rolling country which is found not only in the vicinity of this river but continues for some distance to the west. The quality of the soil varies considerably along that part of the base lines which I surveyed. I will describe it now more fully taking each range in turn, beginning with the west half of range 19, township 64, west of the fifth meridian.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 46).

On July 2, having completed the survey of the seventeenth base line I started for Sturgeon lake over a pack trail located east of the one which I had followed in going to the same place in the fall of 1905. I was thus given an opportunity to learn more about the country west of the Waskahigan and Little Smoky rivers. This new pack trail which leaves Waskahigan river in section 5, township 65, range 22 passes over the high rolling lands overlooking Waskahigan river from the west and runs nearly parallel to it as far as the north boundary of township 65, range 22. Here it leaves the river which now turns more to the northeast in its course to Little Smoky river. The trail now descends to the valley of a large stream which rises in a hilly country many miles to the west. Beyond this creek are four miles of swamp. Thence the trail leads through higher lands extending north to a creek, which runs northerly across township 68, range 22. The trail now keeps along the right bank of the creek for three-quarters of a mile when it leaves it to connect with lake St. Ann pack trail two miles farther. Shortly after this we crossed the creek and continued our journey to the eighteenth base line where we camped on July 5, having travelled this far across a country mostly wooded with poplar, birch and some spruce.

Between the eighteenth base line and Sturgeon lake much of the land west of Little Smoky river is covered with a second growth of small poplar with willow scrub, the only spruce timber left being found in bluffs surrounded by narrow swamps or muskegs. I arrived at Sturgeon lake on July 7, and on the following Monday was travelling towards the sixth meridian, from which I had been instructed to survey westerly, forty-eight miles of the eighteenth base line. The road which I followed in going to the sixth base branches off from the main wagon road running along the south shore of Sturgeon lake just after crossing the bridge which now spans Goose river. If at some future time it becomes necessary to open a wagon road to Simonette river, this will be the direction to follow, as the pack trail is located through a fairly level and dry country thickly wooded with a second growth of poplar and birch. There are at present many openings of prairie land and land covered with small scrub along Moose river, this country having been overrun by a recent fire which burnt the impassable windfalls that covered it three years ago. The land thus cleared is available for immediate occupation and would permit of stock-raising and mixed farming on a small scale. This remark applies also to the country between Simonette river and its chief tributary from the west called Moose river.

SURVEY OF THE EIGHTEENTH BASE LINE.

The survey of the eighteenth base line was carried on under great difficulties and much risk owing to the bush fires which surrounded us and through which we had to cut a passage during the whole time that this survey lasted. The entire land surface

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along the eighteenth base had, until this year, been covered with a thick growth of large poplar, balm of Gilead, cottonwood, birch and spruce. Since the fire this has been changed to impassable windfall. It was expected that after crossing Smoky river we would be clear of the fire, but this did not prove to be the case for in that district also, forest fires were raging. These fires originated two years ago and, as only a few inches of snow fell in that district during the winter of 1905-6, the fires kept smouldering in the wooded sections of the country and when fanned by the wind started again all over the country in the spring of the next year. To the inconvenience resulting from the dense smoke which obscured the sky, must be added the continual danger of losing the camp equipment by fire. The initial point of the survey was the northeast corner of township 68, range 1, which I re-established according to instructions. At ten chains west of the sixth meridian this eighteenth base line crosses Moose river, which is here eighty links wide and was three feet deep at the time of survey. Its banks are ten to fifteen feet high. West of the river a flat, one-quarter of a mile wide, brings us to the foot of steep hills denuded of timber, which rise to a height of two hundred feet above the level of the river. Thence the surface of the country remains undulating and is dotted with many lakes, ponds and hay marshes most of which are connected at high water. Around some of these lakes quite a lot of hay could be cut. Such a lake three-quarters of a mile long by one-quarter of a mile wide occurs near the north boundary of section 29 in township 68, range 1. I noticed some surface stones through this township. This undulating country continues west to the middle of range 2, where it changes to five miles of high rolling country of sandy ridges with many small lakes surrounded by muskegs. West of these sand hills, the country is undulating with lakes and ponds here and there. Running across range 3 from east to west and extending to Smoky river I noticed a large depression probably occupied by a stream which joins the river three or four miles south of the line.

Smoky river crosses the line at the northeast corner of section 32, township 68, range 4. At this point the river is one hundred and thirty yards wide and flows between precipitous banks alternating with flats, at one time well wooded with large spruce. The valley is two miles wide. The bed of the river is three hundred and fifty feet lower than the bench lands on the west side and its channel, which is very tortuous, is frequently filled with large boulders causing dangerous rapids. Along its banks are accumulations of drift wood which extend far into the river and have cost the lives of many prospectors who were bold enough to trust themselves to its waters on a raft. The average velocity of the current cannot be less than eight miles an hour.

When I arrived at Smoky river with my survey I found the water so high and the current so swift that it could not be forded. We then built two large rafts which were to be propelled by means of poles. To make the crossing of the river doubly sure I also fitted oars to the rafts. This proved to be our salvation. Though of large size the raft on which I started was overloaded to such an extent that as soon as sent adrift it was fully covered with eight inches of water. In that condition it drifted diagonally across the river. Soon the water got so deep in the river that the poles became useless. It was then that the oars proved useful and assured our landing. The horses had to swim across but did so only after several fruitless attempts, in one of which it looked as if we would lose three of them. These horses at the start had left the rest and had struck out by themselves down stream. They were swept along by the force of the current in the main channel. At that point the main channel is very much narrowed by piles of boulders and the current runs through it like a mill-race. Here they were lost sight of in the seething waters, appearing for a few seconds above the top of the waves only to disappear again. At the lower end of that stretch of swift water the river takes a short turn to the left. Here are great piles of drift wood and the danger was that if any of them ever got caught under the drift piles they would be drowned. They were, however, carried past that obstacle, for shortly afterwards I saw one of them which had been carried into an eddy trying to climb over a large boulder whose surface had been worn smooth by the action of the cur-

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rent. However, he would only fall back into the river, after each fruitless attempt. He managed at last to reach the shore, but he was so exhausted that he remained there motionless just keeping part of his body above the water. It was in that position that men sent to bring him back found him. The others which we thought had been drowned, were found safe farther down, grazing along the banks of the river and they were brought back to camp. The place chosen for the crossing, was below an island which occupied most of the bed of the river. This island greatly diminished the current of the stream, forming here a large eddy close to the left bank of the river and making a good landing place. As there was no feed on the west side of the river the horses had to be driven upon the bench, but as fires were raging there, two men had to be left to guard them.

As with all streams which rise in the ice fields of the Rocky mountains, the highest stage of water on Smoky river occurs in the middle of the summer. At that time the larger percentage of clay which its waters hold in suspension gives them a peculiar grayish colour. It was noticed during our stay near the river in the first weeks of August that the water would fall during the night and rise again by the same amount the following day. From this I concluded that it took twenty-four hours for the freshet caused by the increased melting of the snow to travel from the headwaters to the latitude of the base line. Thus the average velocity of the current would be four miles an hour, though it is probable that in the high reaches of the river it is considerably more than that. When we crossed this stream a month later the water was not lowered to any appreciable extent. The left bank of Smoky river, where the line intersects, is precipitous and ends in a bench of very poor soil half a mile wide. The next stream crossed by the line was Big Mountain creek. At the time of the survey this creek was simply a succession of large and deep pools connected by small rivulets, but there were indications along the bank that in the flood the water reaches a high level, and the stream must be a regular torrent. Six miles south of the base line I noticed a range of hills 2,650 feet above sea level, where the creek probably has its source. One mile north of the line this stream receives from the west a tributary ten or twelve miles long. Its valley runs nearly parallel to the base line and contains a muskeg which effectually prevented the fire from spreading eastward.

Range 6 contains much high rolling land. The greater part is covered with scrub willow, and is thinly wooded with a second growth of poplar and birch. There is also some partly open country. The west half of this range is stony in places. All the brooks, large and small, crossed by the line, were dry, and the water for the use of the camp had to be drawn from wells dug in the muskegs which had not been over-run by fire. Later on, however, a flowing spring, which was discovered near the centre of section 31, supplied us with the only running water we had had since leaving Big Mountain creek. This spring feeds a creek which flows to the southeast, where it is reported to join Big Mountain creek. Another creek which crosses the line in section 32 runs northward and empties into the west branch of Big Mountain creek.

In range 7 the surface varies from rolling in the east half to undulating in the west half of the township. Here also the recent fires have cleared the land of much of the dead timber with which it was covered. From the northeast corner of section 32 the surface slopes down to the valley which cuts that section diagonally and where there are still bluffs of green timber. These bluffs, being surrounded by swamp, have so far escaped the ravages of the fire. In the southwest of this township some high ridges were noticed. Running streams are scarce, only two small creeks, five miles apart, crossing the north boundary of the township. There is a small hay meadow near the northeast corner of township 68, range 8. The surface of the country in range 8 is frequently broken by narrow sandy ridges running in general east and west, with many muskegs between. The soil is pretty uniform in quality, being a clay covered with about six inches of light soil. Stones were seen at different places in this township.

Three pack trails intersect the eighteenth base line between ranges 1 and 8, in-

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clusive, west of the sixth meridian. The first one was noticed on the bench forming the left bank of Smoky river. It passes at thirty chains west of the northeast corner of section 32, township 68, range 4. This pack trail will be impassable now on account of the heavy windfalls which cover the country. The next one is well defined, and intersects the base line one-half mile east of Big Mountain creek. This trail leads to Wapiti river, ten miles to the north of the base line. After crossing this river it joins the trails to Saskatoon, Bear Lake and Grande Prairie Settlement. A third trail, also well travelled, crosses the line in the middle of section 31, township 68, range 6. It leads towards the north across four or five miles of pretty open country; thence through a forest which continues as far as Wapiti river. On the north side of this river it leads to the trading post at Saskatoon lake. From Lesser Slave lake I travelled seventy-five miles to Peace River Landing. Here I crossed with my outfit on the ferry and proceeded by wagon road to Brick's Settlement, thirteen miles to the southwest of the landing. I met Mr. Brick, the local member, and from him obtained much valuable information regarding the country which I was to survey.

On October 2, having received all my supplies, I left the settlement by the Dunvegan road, which I followed to its intersection with the old Hudson bay cart trail. From there I continued my journey in a northwesterly direction and camped at the south shore of Bear lake, within three miles of its west end. The next day I reached Last lake at the northeast corner of township 83, range 1, west of the sixth meridian. Between the settlement and Last lake are many poplar groves and willows, with patches of prairie, but there is very little timber of any use except for firewood. The soil is good throughout. North of Last lake we entered an undulating country, with some windfall and the remains of old *brulé*, which is at present overgrown with young poplar, birch and willow scrub.

On October 8, we struck the twenty-second base line, surveyed many years ago, and consequently hardly visible, and camped near a creek a quarter of a mile east of the northeast corner of township 84, the initial point of my survey.

SURVEY OF PART OF THE TWENTY-SECOND BASE LINE FROM RANGE 21 TO THE SIXTH MERIDIAN.

The twenty-second base line runs at a short distance south of the summit of Whitemud hills which divide the valleys of Peace and Whitemud rivers. These hills rise above the surrounding country from three hundred to five hundred feet and cross the sixth meridian in township 85. From the sixth meridian they extend east as far as range 25 west of the fifth meridian. In that distance, thirteen and one-half miles of rolling country, the land is strewn with much dead timber. It is also stony in places in the east half of range 25. No prairie exists at present along this base line, but were any fire to get started, a pretty clean sweep would be made of all that dead timber, and this would render that part of the country valuable for grazing purposes. In many other sections where this has occurred, the land has grown in great profusion nutritious grasses such as peavine, etc. Numerous brooks take their rise in the ponds and marshes at the summit and flow down from these hills in all directions. Those which flow north, run into Whitemud river, while streams flowing south, empty into Bear lake which is about eight miles long by three miles wide. The land at both extremities of this lake and for some distance along its south shore is said to be boggy, and this saved from the fires a very small area northeast of Bear lake. Here to-day can be found a strip of green spruce three miles wide. Since 1896 fires have overrun the country along Peace river and therefore this part is full of windfall. The same remark applies to the range and a half adjoining the sixth meridian. The rest of the country, especially the summit of Whitemud hills, is made impassable by the large number of dead trees on the ground. The soil in the fractional range 26 and in the whole of range 25 is black loam from two to five inches in depth with a clay subsoil. All the streams are small and flow south towards a creek which enters Bear lake near the west end. This creek crosses the line near the northeast corner of section 31, range 25, and flows through a high rolling country while along one bank runs a well defined pack trail which leads to the west end of Bear lake. Small brooks

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flowing south cross the boundary nearly every mile. From range 25 the ground slopes eastward throughout range 24 and there the rolling country ends, the country from that point to the outlet of Bear lake in section 32, range 23 being level. There are here some hay meadows and tamarack swamps that drain into the outlet of Bear lake. This outlet, a sluggish stream forty links wide with a soft muddy bottom, flows north into Whitemud river, crossing the line near the northeast corner of section 32. The divide between its valley and that of Peace river is crossed at the northeast corner of section 33. The approaches to this stream are boggy and it was found necessary to make a corduroy road and to throw a bridge over the creek before it could be crossed by the pack animals. East of the stream the surface of the country changes from undulating to rolling. Three miles beyond the divide is another stream which rises from three lakes lying four miles north of the base line. Hay lands, in irregular patches, are found around these lakes and along this creek. A rancher, Mr. St. Germain, has cut twenty miles of roads from his farm on Peace river to these lakes, which is the nearest place where sufficient hay can be procured to feed his cattle. It is now his intention to cut this road northward to Whitemud river, which he claims is not very distant and where extensive prairies are reported to exist. Through range 22, there are many hay meadows, the largest being in the east half of section 33. From the northeast corner of section 35 the ground begins to slope down gradually to the west edge of Peace river valley. From that point precipitous cutbanks lead to the river banks, a drop of seven hundred feet in half a mile. On the fourth, the survey having been carried as far as the river, we returned to the landing, effecting the crossing of the river, just before this became impossible on account of floating ice. From the Hudson's Bay company's trading post at Peace River Landing, we cut a trail along the river to the twenty-second base line, and camped near an island close to its right bank. The distance across Peace river on the line is eight hundred and fifty yards, from shore to shore and six hundred and thirty yards between its left bank and the near shore of an island, separated by a narrow channel from the right bank. The summit of the bench which faces the river from the east, occurs at one and three-quarter miles from the river and is seven hundred feet above the river. This bench is thirty chains wide; then a gulch six hundred and seventy-five feet deep and three-quarters of a mile wide occurs. Then a second bench also thirty chains wide is followed by a very wide and deep ravine. On the west slope of this ravine was erected the monument which marks the northeast corner of township 84, range 21, west of the fifth meridian. This ended my survey of the twenty-second base line.

Description of the country along part of the twenty-first base line through ranges 21, 22, 23 and 24, all west of the fifth meridian.

(NOTE.—Descriptions of townships surveyed have been taken from this report and published as part of Appendix No. 46.)

Description of the country along the twenty-second base line between range 21, west of the fifth meridian, and the sixth meridian.

(NOTE.—Descriptions of townships surveyed have been taken from this report and published as part of Appendix No. 46.)

When I returned to Peace River Landing after completing the survey of the twenty-second base line, I was informed that there was a pack trail from the Hudson's Bay company's post. It runs north for twenty-five miles, which would bring it to Cadotte river. This trail might prove to be the right one to use in going to the twenty-second base line if, at any future time, it was decided to have it surveyed farther east. By following it, all the deep gulches in the vicinity of Peace river could thus be avoided.

West of Peace river the following well defined pack trails, which intersect the twenty-second base line were noted:—

A pack trail, running north and south, intersects the north boundary of section 32 in township 84, range 25. It is located on the left bank of a good sized stream flowing into Bear lake. Four miles south of the base line it leaves the valley of the

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creek, and turning a little to the east, passes close to two small lakes, before it comes to the west extremity of Bear lake. Another well travelled trail is the one which crosses the north boundary of section 36, range 24. From its intersection with the line, it leads northerly to Whitemud river, and southerly to the Roman Catholic mission on Peace river. It passes close to the north end of Bear lake. There is also our wagon road which runs north from Last lake to join the wagon road opened by Mr. Selby along the base line, west of the sixth meridian. It was found necessary to continue this road easterly to range 23. The settlers at Peace River Landing and at Brick's settlement are at a great disadvantage as far as their supply of hay is concerned. Those living along the road leading from the Landing to Brick's Settlement have to go over twenty miles, but even at that distance they cannot procure all they require. They are going to continue the hay roads several miles north of the base in order to reach some meadows surrounding a group of lakes, around which they expect to procure more hay. At Brick's Settlement, they have to go as far as Last lake, a distance of twenty-five miles. Around Bear lake some hay could also be put up, but the supply is not assured as it depends much on the depth of water in the lake. Those living on the right bank of Peace river have to travel southeast to Little Prairie, twenty-two miles distant. This district supplies most of what is required at the Landing. The northern limit of the forested country which extends northward from the Landing, runs parallel to the north boundary of range 21 and within a short distance of it. East of range 21, the most easterly range surveyed by me, the country is level. There most of the country seems to have been over-run by fire five years ago and what appeared to be partly open country was noticed north of the future location of the twenty-second base line. I am informed that a well travelled pack trail, which begins at the Landing, runs through that section for twenty-five miles, which would bring it to Cadotte river. Whenever it is decided to continue the survey of that base line, this trail will be the proper one to follow as it goes far enough east of Peace river to avoid all the wide deep gulches which lead down to it.

On November 15, we returned to the Hudson's Bay company's trading post at the Landing, whence I proceeded to Little Prairie, a distance of twenty-four miles, in a southeasterly direction. We stopped at the place of Archy Campeau, a half-breed squatter, who agreed to supply baled hay and grain, and to deliver it on the line wherever it would be most needed. There was, at that time, enough snow to make good sleighing, so I rented two sets of sleds. I also kept five horses, out of the sixteen I had, and provided a tent for them. The others were driven back to Prairie Settlement for the winter. From Archy Campeau's it was found necessary to open a sled road westward to Smoky river. On the 20th we moved seven miles in a southwesterly direction and camped at a small prairie, close to a good-sized creek. For the first three miles from Campeau's the trail runs across prairie lands, with scattered clumps of willow and a few poplar bluffs. This sort of country extends to the valley of North Heart river, a stream one chain wide and three or four feet deep. The water runs swiftly over a gravelled bottom. On each side of the river, at some distance from the bank, there is a bench of land fifty feet high. Across the river the land is thinly timbered with poplar and birch and many small prairie openings surrounded by willow scrub. The men were daily kept at work on the road. On December 15 we reached the valley of Smoky river, having come through a nearly level country fairly well wooded. The forest is partly free of underbrush, and as there is no windfall, we made good progress with the road, considering the short days. The land is a good clay with a few inches of alluvial soil on top. Range 21 and the east half of range 22 are well watered by numerous running streams, while in the west half of range 22 are extensive hay meadows occupying shallow depressions parallel with the general course of the river, distant three miles west. On December 15 we reached the valley of Smoky river, but its banks are so high and so precipitous, that I saw at once the impossibility of travelling any farther west with the sleds. Explorations were begun along the banks of the river, and a gulch leading to the river was discovered. This

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gulch follows the north boundary of section 3, township 80, range 23 and, though its bottom was found piled high with dead trees, and though its sides were very steep in places, I managed to clear a pack trail down this ravine to Smoky river. West of the river another gulch was found, one mile south of that one followed on the opposite side. Up this first gulch the ascent is more gradual, and it was a comparatively easy matter to get to the top of the bench, seven hundred feet above the river. From the valley of Smoky river to the east boundary of township 80, range 25, the distance is eight miles through wooded country. On December 25 the pack trail had been opened to within three-quarters of a mile of the initial point of my survey.

The survey of the north boundary of township 80, range 24, was made according to your instructions, and by January 9, the work had been carried east as far as Smoky river, which flows from south to north across the middle of this township. The whole country west of Smoky river is undulating, covered with much underbrush and wooded with timber averaging twelve inches in diameter. The soil is five or six inches of black loam with a subsoil of clay. Owing to the proximity of the valleys of Peace and Smoky rivers no large creeks were crossed by the line; still sufficient water could be found in the numerous willow swamps which dot this part of the country. A large muskeg extends north of section 33, and small streams flowing north cross the north boundary of section 32. On the line Smoky river is three hundred and thirty yards wide. It is a swift flowing stream, whose channel is frequently obstructed by large quantities of boulders. Its valley from side to side is one mile and one-quarter wide, and is inclosed between high mud banks with only a narrow margin of flat land next the banks of the river.

Range 21 being in the basin of North Heart river, is well watered by several tributaries of that stream. At a quarter of a mile south of the north boundary of section 31, there is a large hay meadow. All through this range there are many willow swamps from which rise nearly all the creeks flowing southeasterly into North Heart river. The west branch of the pack trail from Little Prairie, crosses the line in section 34. This country along Smoky river is now made accessible, from Little Prairie, by means of the road which I had to open westward, between the Peace river wagon road and Smoky river. All the prairie land found at Little Prairie would be included in the north half of township 80, range 18, the west half of township 81, range 18, and in the east half of township 81, range 19, all west of the fifth meridian. There are at present living at Little Prairie, a few halfbreeds, trappers and freighters who have located along the Peace river road. They keep cattle and horses and put up hay in very large quantities, with which they supply the freighters and the settlers at the Landing. They have not yet attempted any kind of cultivation though the land is fertile and well watered by North Heart river and its many tributaries.

On January 31, I left Little Prairie for Lesser Slave lake, where I arrived on February 2. Here I stored part of my outfit with Mr. M. Revillon, and the five horses which we had kept on the winter work, and some outfit and supplies were turned over to Mr. O. D. Hill, of Prairie River Settlement, to be cared for till such time as they would be required again by the government surveyors. I then made arrangements with Mr. Hawkins to bring my party down as far as Athabaska Landing. From that place I went to Edmonton with some returning freighters. Here I received your instructions as to the shipment over the winter roads towards the mountains, of supplies which would be required by surveyors to be employed during the next summer. I found it necessary to give my personal attention to every detail, and left only after I had seen each surveyor's supplies and survey posts separately loaded and made ready for their destination.

My surveys of last season were distributed over a large area, which necessitated long trips between each work and considerable road cutting in places. Besides, the forest fires, which were overrunning the country along the eighteenth base line west of the sixth meridian, were so fierce, at times, on this line, that it was very doubtful

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many times, where we would pass through, and I must say that it was only by taking every chance that this was successfully done.

Large game is found everywhere in these woods. Large colonies of beavers were seen on almost every stream, where coyotes and other fur-bearing animals are numerous. In the streams, pike, pickerel and trout were caught. As to minerals, coal is the principal one found so far, and there seems to be no scarcity of it. According to people who have lived there for some years, the climate of that part of the country is better than that of the country to the south.

I have the honour to be, sir,
Your obedient servant,

ARTHUR SAINT CYR, *D.L.S.*

APPENDIX No. 39.

REPORT OF J. B. SAINT CYR, *D.L.S.*

SURVEYS AND RESURVEYS IN MANITOBA.

STE. ANNE DE LA PÉRADE, QUE., December 13, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to report as follows on the survey and resurvey made in Manitoba in October and November, 1906.

On my arrival in Edmonton from the Peace River district, October 12, I received your telegram telling me to go to Pipestone, Manitoba, where instructions were awaiting me. I left Strathcona on October 23, having been delayed in Edmonton waiting for my baggage from Athabaska Landing, and arrived at Pipestone the 25th of the same month.

Having made the necessary arrangements, the following day I began the survey of that portion of township 6, range 26, west of the principal meridian, which had not been previously made, the country being flooded at the time of the original survey. I also made the resurvey of some of the old lines, as a few corners could not be found by the owners of the land. This survey was completed on November 10.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 46.)

On November 6, I commenced the survey of all the section lines in township 6, range 25, around Marshy lake and adjoining the south part of a great marsh, generally called Maple lake by the people of that place. I also made the resurvey of the lines of sections 5, 6 and 7, in the same township. The whole was completed on November 23.

On November 12, I went to township 6, range 27, to settle a difficulty between settlers about corners of sections 19, 20, 30 and 29. Having brought these people to a certain agreement, I surveyed the north boundary of sections 19 and 20 as indicated on the original plan, fixing and marking the different corners with cedar posts and making the proper mounding.

Reston is the nearest railroad station from this township; it is situated about three miles north of section 19. There are grain elevators also in this important place. I noticed here, as well as in the adjoining townships, that very large fields had

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been ploughed by the settlers. The farmers seem to be well off, and have great faith in the future of this wheat-growing country.

November 23 I left Pipestone, Manitoba, on my way home.

I have the honour to be, sir,
Your obedient servant,

J. B. SAINT CYR, *D.L.S.*

APPENDIX No. 40.

REPORT OF J. B. SAINT CYR, *D.L.S.*

SURVEY OF SETTLEMENTS IN PEACE RIVER DISTRICT.

STE. ANNE DE LA PÉRADE, QUE., December 5, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report of my field operations during the past season in the Peace River district, together with some information regarding the country in the neighbourhood of Fort Vermilion.

In accordance with your instructions, dated May 2, 1906, I left Ste. Anne de la Pérade on the 12th of the same month for the Northwest.

On May 18, I left Edmonton, and on June 14, I arrived at Fort Vermilion, Peace river valley. I spent several days forming a party in order to do the survey of Fort Vermilion Settlement (south of Peace river). This was a rather difficult task, especially in that country where people have a great deal of work to do on their farms. Grain culture has paid well at Fort Vermilion in recent years, the Hudson's Bay company paying as much as one dollar and fifty cents a bushel for wheat. Otherwise the farmers who may have some spare days are engaged with the company to work at the mills, on their farm, at some buildings in construction and on the steamer.

On June 19, I began the survey of Fort Vermilion Settlement, which I closed on July 28, all my men having gone for the hay harvest. This settlement extends over six ranges containing in all fifty-five lots of various dimensions. Every range line runs east and west and the division lines of the lots north and south.

A tract of land of about three miles and a half from east to west by three miles and a quarter from south to north forms that portion of the settlement surveyed. The Hudson's Bay company has its reserve adjoining Peace river and nearly in the middle of the settlement. The subdivision has been made in such a way as to give to every settler his improvements.

The general aspect of the country is prairie and bluffs and the soil is a black sandy loam overlying a clay and sandy subsoil. The bluffs are timbered with spruce and poplar three to fifteen inches in diameter, with clumps of large tangled willow. The bank of the river stands about eighteen feet above low water mark. The land is level in the central portion of the settlement to a third of a mile inland where the ground rises about fifteen or eighteen feet. From the summit of that elevation an immense plateau extends towards the east, the south and the southwest.

No minerals of economic value were found during the progress of the survey, and there is no water-power. Hay is rather scarce here; settlers have to go as far as ten or fifteen miles and sometimes more to procure the quantity required to feed their cattle during the winter. Wood for fuel is very plentiful.

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I will give further on, details of the climate, the general resources and features of that portion of Alberta. The Hudson's Bay company own a very extensive establishment at Fort Vermilion, including a sawmill and a modern flour mill. The two missions have also a number of buildings and cultivate large fields. The most of the settlers around Fort Vermilion last summer had from forty to a hundred acres under crop. Besides the missions and the Hudson's Bay company there are twenty farmers south of the river on an area of about ten miles by three miles. Mr. Sheridan Lawrence is one of the biggest farmers there and has an extensive farm at Prairie Point, fifteen miles above Fort Vermilion on the north side of Peace river. Mr. Lawrence's crop last fall was nearly five thousand bushels of wheat and two thousand bushels of oats and barley. Very good buildings have been erected there by him. Every one of these farmers has a large number of cattle and horses and have all the implements necessary on a farm.

Among the petitioners to the government some are no longer residents of Fort Vermilion, viz.: Erastus John Lawrence, Clara Lawrence, Henry H. Lawrence, Prudent d'Amour, Minnie E. Lawrence, Paul Meechatsio, Henry P. Panter (residing at Peace River Landing), Clement Paul (at Keg river), Xavier Sawan (at Wolverine point) and John Flett. They have sold out their buildings and improvements on the farms formerly occupied by them.

Peace river is very beautiful and wide, with a current of about five miles an hour at high water and two to three miles an hour during the low water period. The channel varies a good deal in depth in different places on account of the sand and gravel bars which nearly cross the river. In front of the Hudson's Bay company's reserve. I found that the deepest parts of the channel measured thirty-four feet at low water, in the month of October. When the snow is melting in the mountains in the months of June and July, the river rises sometimes ten to fifteen feet above low water mark. A great number of well timbered islands are seen all along the river.

On June 20, I began the subdivision of North Vermilion Settlement (north of Peace river), which I completed on September 5. The country there is more timbered than in the other settlement. All the fields now under cultivation have been cleared. The soil is of a better quality, being a deep black loam resting on a clay or sandy clay subsoil. This settlement consists of only one range with fifteen lots in it. I have been obliged to give to the division lines, to correspond with the improvements of the settlers, a bearing of $334^{\circ} 00'$ instead of north and south. The timber consists of poplar and spruce varying from six to fifteen inches in diameter with patches of thick large willow. The country is undulating on that side of Peace river. Hay is plentiful along Gull lake, Gull creek and Shoal lake north of this settlement. Gull creek is the only stream in this settlement. It was dry last summer and can be used as a water-power only in the spring or in rainy summers. The Roman Catholic mission has built a dam and erected a mill on that creek in lot No. 4. There are two fur trading posts here, one store owned by the Hudson's Bay company and the other by Revillon Bros. Both companies are doing well, for the fur-bearing animals abound in all the surrounding region. There are only seven farmers in this settlement. No mineral of any description has been found. Before the commencement of this second survey I made a traverse of Peace river and of the islands, connecting the two settlements to get the distance across the river and to establish the respective positions of these.

On September 12 I started the subdivision at Boyer Settlement and on the 24th of the same month I was forced to close the survey because the few men I had, were leaving the work to do their ploughing. As it was useless for me to think of forming another party to complete this survey and that of Fort Vermilion, I left the place on September 25 on my way to Athabaska Landing. I arrived in Edmonton on October 12, where I received your telegram telling me to go to Pipestone to make certain surveys in Manitoba.

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In Boyer Settlement the soil is of first quality almost entirely. It is composed of a deep black loam and black sandy loam overlying a clay and sandy clay subsoil. This country is undulating and the surface is prairie and bluffs principally timbered with poplar and spruce mixed with large willow. This timber measures from six to fourteen inches in diameter. This settlement is bounded on the north by Boyer river flowing into Peace river. The first mentioned stream has a depth of two to fifteen feet and a width of about a chain and a half to two chains, and a current of a mile and a half an hour. A few miles west of the settlement the river is divided into two branches, one coming from the northwest and the other taking its water twenty or twenty-five miles west of Wolverine point, in the neighbourhood of Keg river. The hills adjoining the river are from sixty to seventy feet high and their slopes are thickly timbered with poplar, cottonwood, spruce and large willow.

Boyer settlement contains thirty-one lots and is connected with the other near Peace river by the prolongation of the division line between lots No. 5 and No. 6.

The people travel from one village to the other by two wagon roads, one of which starts from the southwest corner of lot 5 and the other one passes between lots 22 and 23, meeting one another near the fur trading posts situated on the north side of Peace river. Hay is abundant around Gull lake and Shoal lake and also along Gull creek. Shoal lake was nearly dry last summer. No mineral of any description has been found here during the survey.

Particulars about the country through which I travelled last summer and means of communication.

In the country surrounding Lesser Slave lake and along the river of the same name the soil is very good. The surface is mostly bluffs and prairie in the neighbourhood of Swan river, Driftpile river, and also in the upper part of Lesser Slave river. There is more bush than prairie in those places and along the trail leading to Peace River Landing and also along Athabaska river, but the soil is of first quality.

Peace river flows between hills seven hundred to eight hundred feet high, for a long distance above and below Peace River Landing. Nevertheless there are small flats of alluvial deposits here and there close to the river banks. The country is nearly level on top of the above mentioned hills bordering Peace river. The low valley of the river begins to widen near Wolverine point, about two hundred miles below Peace River Landing, and at Fort Vermilion it extends from forty to fifty miles into the interior on both sides of the river.

From Keg river, west of Wolverine point and following the bank south of Boyer river the prairie runs as far as Boyer Settlement, and northwest of this last place to a distance of about fifty miles. With the exception of a belt of bush ten miles wide, the country is mostly prairie and the soil very good. There are a few muskegs here and there, but the land fit for cultivation is very extensive. A prairie thirty miles long lies also north of Buffalo Head mountain with some very good hay ground. There is nearly twenty miles of forest between this open country and Fort Vermilion. Scattered patches of prairie three to five miles in diameter are met with north of Peace river from Vermilion falls to Caribou creek. Large openings in prairie can also be seen along the road from Mustus lake to Fort Vermilion in an approximate distance of twenty-five miles.

The lower Peace river valley is reached with more facility than it used to be a few years ago owing to the newly opened trail from Athabaska Landing to the mouth of Lesser Slave river, and from this last point there is another wagon road passing on the north side of the above-mentioned river, which connects with the trail south of Lesser Slave lake. From the upper end of this lake the Peace River Landing wagon road strikes one of the navigable points on Peace river.

The Hudson's Bay company are the owners of a large steamer *The Peace River*, making three full trips every summer from Fort Vermilion and the Falls to Peace River Landing, Dunvegan and St. John and sometimes to Hudson Hope, forming about eight hundred miles of good navigation. Some of the residents of Vermilion often

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build rafts at Peace River Landing to take down the river horses, agricultural implements provisions and furniture. In the spring time they generally reach Fort Vermilion in four days as the current is very strong. The first trip of the steamer up the river is made in the latter part of May and her last trip down stream is in September, though the season of navigation could be counted from the middle of May to the last days of October. I obtained from Mr. F. A. Wilson, manager of the Hudson's Bay company's post of Fort Vermilion, a record showing at what time the river freezes in the fall and at what date it is clear of ice in the spring at Fort Vermilion.

GENERAL RESOURCES OF THE COUNTRY.

As stated above large tracts of the best land, some in bush and some in prairie, can be located all through the country, which are very well adapted for farming and ranching. On account of the small elevation above the sea, of the lower Peace river valley, the climate is comparatively good, very warm in the summer and not very cold in winter.

The farmers and immigrants will find there, a very fertile soil, growing admirably wheat, oats and barley, also all kinds of vegetables, and they will be in a position to compete with farmers of the other northern provinces in the Dominion. The wheat grown there is of first quality and ripens rapidly during the long summer days. I have seen extra good, large vegetables in every garden and field of the settlements around Vermilion. I measured some heads of cabbage four feet in circumference. The turnips, potatoes, carrots, &c., grow also to a very large size.

The timber found in the Peace river valley is poplar, cottonwood, spruce and willow, with a few white birch here and there. Spruce suitable for commercial timber is seen more or less in the vicinity of the river. There is a continuous succession of islands in this large river, thickly timbered with spruce of good quality.

The Hudson's Bay company has erected a modern flour mill and a sawmill. Both are operated by steam power and situated on the company's reserve at Fort Vermilion. The flour mill has a capacity of forty to fifty barrels a day, while the sawmill can turn into lumber in a day, one hundred logs. The Roman Catholic mission have also on Gull creek, north of Peace river, a flour mill of a capacity of ten or fifteen barrels a day, and the sawmill will probably saw twenty or thirty logs a day.

Great deposits of limestone are found at Vermilion falls and near Red river forty miles farther down the river. A large quantity of very good lime is manufactured every year by the people of the country. Ordinary salt exists in large quantity near Salt river, a tributary of Peace river and situated about one hundred and thirty miles below Vermilion falls.

There is a seam of soft coal sixty or seventy feet above the level of the river at the place called 'The Cliff,' fifteen miles north of Peace River Landing. The seam appears to be from three to five feet thick, and the coal is reported to be of good quality.

The principal mountains in view of Vermilion are the Buffalo Head mountain south of the river, and Caribou mountain lying north and northeast at a great distance from the river. I have been told by some hunters that very large lakes well stocked with trout and whitefish are found on these mountains. Bears, moose, lynx, marten, mink and foxes are very plentiful. Thousands, I should say, of wild geese and ducks of different species are seen all through that country.

CLIMATE.

All last summer the temperature was very fine, although somewhat warm. We did not have many rainy days. The vegetation is very luxuriant and rapid in the Peace river valley. When I left Edmonton on the 23rd of May last, the grass was only beginning to shoot out of the ground, and on my arrival at Peace River Landing the 8th June, on the river flat the new grass was over a foot long and the rose bushes were all in bloom. Similarly this fall when I left Peace River Landing

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the 2nd October the leaves of the trees were but little injured by the frost, and at Athabaska Landing the 10th of the same month the trees were completely stripped. Any old timers in the Peace river valley say that the winter is not so severe there as it is in many other localities farther south. The stiff cold may last two or three days at a time, after which the weather becomes milder for a week or two. The fall of snow during the winter may be compared to that of the province of Quebec in the St. Lawrence valley, being from two to four feet.

I am indebted to Mr. Alfred S. White, missionary of Fort Vermilion, for a record of the extremes of temperature from September, 1905, to August, 1906, which I have annexed to this report. I have had also some information from Father C. H. Jousard and Father Habey, also missionaries at Fort Vermilion, regarding the country. As these gentlemen have travelled this district in all directions in the summer as well as in the winter, for years, they are very well informed about the different resources of the country. I have myself explored in a radius of fifteen to twenty miles around Vermilion and found the country exactly as represented to me.

I do not doubt that before long this lower Peace river valley will prove furthermore to be exceedingly good in all respects.

I have the honour to be, sir,
Your obedient servant,

J. B. SAINT CYR,D.L.S.

RECORD of the breaking up of the ice in the spring, and also of the first crossing on the ice of Peace river at Fort Vermilion, from the year 1890 to 1906.

Year.	Ice Move.	First Crossing of the River in Boat.	Ice Drift.	First Crossing on the Ice.	Remarks.
1890 .	May 4....	May 8....	November 16...	November 30..	Current on Peace River is nearly five miles an hour at high water and one and one-half to two miles an hour at low water.
1891...	April 23....	" 1....	October 29...	" 12...	
1892...	May 11....	" 15....	November 4...	" 8...	
1893...	" 3....	" 10....	October 31...	" 4...	
1894...	April 29 ...	" 6....	November 1...	" 10...	
1895...	" 25....	April 29....	" 7 ..	" 15....	
1896...	May 2....	May 5....	" 7...	" 10....	
1897...	April 20....	April 26....	" 10...	" 13...	
1898...	" 25....	" 27....	October 27...	" 1...	
1899...	May 5....	May 10....	" 20...	" 12...	
1900...	April 14....	April 20....	November 4...	" 15...	
1901...	" 26....	May 3....	" 2...	" 6...	
1902...	May 1....	" 6....	" 4....		
1903...	" 3....	" 13....	" 11 ..	November 19..	
1904...	April 17..	April 24....	" 16...	" 30.	
1905...	" 27...	" 30....	October 23...	" 1.	
1906...	" 20 ...	" 22....			

Record of Extremes of Temperature, Fort Vermilion, Peace River, from September, 1905, to August, 1906.

1905.										1906.														
September.		October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
1	70.0	38.4	44.5	22.7	37.0	8.4	3.0	-14.0	12.0	-4.0	8.0	-0.4	14.5	2.0	44.8	14.5	59.0	33.0	69.0	42.7	87.8	52.3	67.0	31.5
2	77.0	47.5	48.5	27.0	26.5	10.6	16.0	3.1	5.8	-5.6	12.0	-21.2	29.0	5.8	44.0	21.9	48.0	33.0	76.8	37.5	93.7	54.0	76.0	39.5
3	74.3	48.0	41.2	32.0	30.5	12.2	19.0	2.0	32.0	3.5	3.5	-16.2	32.5	14.8	53.0	22.0	44.9	29.7	73.4	46.4	93.7	61.2	76.0	50.0
4	76.2	42.8	41.8	29.0	27.5	12.8	21.0	5.4	31.5	12.0	4.7	-29.2	32.8	6.0	31.0	22.0	45.5	25.0	74.6	52.4	88.2	59.7	77.0	49.5
5	69.3	46.5	44.4	28.0	29.0	15.0	24.0	7.0	6.0	27.0	5.0	-18.6	10.2	1.5	47.7	22.1	54.0	29.0	73.0	42.5	83.5	49.0	82.5	49.0
6	57.2	47.5	44.3	32.0	33.6	17.0	16.0	7.0	-12.5	23.0	12.9	4.7	17.0	18.0	52.3	19.6	52.5	25.0	78.0	42.5	87.5	45.0	76.5	50.5
7	59.4	34.7	42.8	31.6	42.0	21.8	3.0	-20.0	9.0	19.5	16.0	-11.0	42.0	21.0	58.0	21.0	47.8	23.5	70.0	54.0	88.5	58.5	70.8	50.5
8	59.9	30.5	44.2	33.0	29.0	9.6	3.8	-13.8	41.0	7.0	16.3	-1.2	33.0	5.0	54.8	37.8	47.8	27.0	57.4	50.2	92.0	65.0	70.5	46.5
9	60.5	34.0	45.0	22.0	39.6	9.0	..	..	34.0	28.9	16.2	2.0	15.0	-21.0	49.8	22.1	68.5	..	60.5	52.3	85.7	48.0	78.5	44.8
10	46.2	35.0	43.9	30.0	28.8	14.0	21.1	-5.0	9.0	28.0	17.0	-12.0	7.2	-30.0	53.6	27.3	65.0	31.8	69.0	38.0	84.5	58.8	66.0	50.0
11	43.1	26.5	54.8	35.0	..	22.0	3.2	17.3	2.0	22.0	11.5	-4.2	10.0	-30.2	45.7	22.7	67.4	40.7	60.8	46.0	71.5	51.5	80.0	51.8
12	61.5	..	..	28.8	47.5	21.9	0.7	-12.7	-13.5	2.5	12.0	-30.0	9.8	-28.2	60.5	28.5	69.0	37.0	69.4	38.0	82.5	48.0	78.8	51.0
13	60.8	40.9	42.0	29.9	36.0	28.4	12.0	-2.0	-13.0	26.0	13.0	-21.2	17.0	-26.0	60.3	30.5	69.0	41.0	69.4	38.0	82.5	48.0	78.8	51.0
14	58.0	41.0	47.0	26.8	43.0	23.0	29.0	11.6	-16.0	43.0	9.0	-15.2	24.0	9.0	62.2	38.0	53.0	41.1	73.0	49.8	87.0	54.0	72.5	42.5
15	61.6	31.2	37.0	24.0	44.0	23.0	19.0	4.5	-22.0	43.0	-6.0	-16.0	..	..	65.3	35.7	60.2	40.0	66.0	44.0	87.2	59.2	77.5	45.0
16	63.0	40.1	29.2	5.1	40.6	13.8	10.0	-9.0	-17.0	40.0	4.5	-10.5	30.0	-5.0	67.0	30.8	60.7	37.3	..	44.0	81.0	40.8	60.5	33.5
17	59.8	30.0	20.9	2.9	34.5	21.0	..	..	-15.0	34.9	12.5	-6.5	11.0	15.0	56.0	26.1	67.6	29.4	74.6	39.5	70.8	48.0	62.5	33.8
18	59.9	33.0	24.4	5.4	36.8	15.8	4.0	-19.0	-12.7	24.5	11.9	7.0	21.0	0.0	59.3	37.7	70.3	35.0	..	..	74.8	51.0	65.5	39.5
19	69.5	34.0	29.0	14.1	34.6	9.3	3.8	-8.0	-16.0	33.5	12.0	6.0	29.5	13.0	51.8	29.0	71.5	45.5	70.2	42.2	77.5	45.6	63.5	37.0
20	58.1	30.0	36.4	23.2	29.4	12.9	5.0	-8.0	-27.0	47.0	13.6	6.0	25.5	18.0	56.1	27.6	73.8	36.5	69.0	44.4	67.5	44.0	67.5	35.8
21	61.5	25.0	34.4	19.0	38.0	19.8	3.0	-20.2	-31.0	46.2	17.2	0.6	18.5	-4.0	60.5	31.0	73.7	41.6	71.5	41.5	80.0	46.0	72.0	34.5
22	48.3	31.3	21.1	12.8	31.9	4.0	7.5	-8.0	-27.0	42.0	5.2	-39.2	17.5	0.0	63.8	37.0	67.8	36.8	81.0	50.0	84.5	50.5	70.5	44.5
23	51.0	33.8	23.7	13.0	29.6	15.5	..	..	-20.1	28.0	0.8	-38.2	33.0	4.5	66.0	30.0	59.5	36.8	84.3	46.5	85.0	50.0	70.5	50.0
24	51.5	35.0	21.3	19.7	32.2	13.1	8.0	-8.0	-16.0	22.0	-0.3	-27.0	31.0	7.0	58.0	29.2	65.4	44.0	89.0	52.0	87.3	48.5	59.2	35.2
25	49.6	32.0	21.0	6.5	21.2	-15.0	5.1	-7.1	0.5	16.0	4.5	-22.0	37.8	1.0	52.5	30.0	71.2	46.2	87.0	57.5	82.5	55.5	68.5	44.0
26	49.2	34.6	17.7	3.9	10.2	-21.5	0.2	10.1	8.0	5.0	16.2	-15.0	50.5	17.0	65.0	36.1	66.5	39.7	77.0	54.5	79.3	59.2	60.0	39.8
27	49.0	31.0	12.0	1.0	2.0	-18.5	1.0	11.0	16.0	..	12.0	-5.5	17.5	20.0	63.5	35.7	68.8	33.8	68.0	54.0	79.0	50.0	59.0	34.0
28	42.7	33.8	19.0	4.0	2.2	-15.2	3.5	-9.3	10.5	5.0	9.2	..	..	21.0	66.4	32.0	71.9	37.0	71.5	58.0	80.0	57.5	57.8	28.5
29	44.1	31.0	27.0	8.5	0.2	-22.0	-11.1	-31.6	0.0	12.2	..	..	55.7	21.0	65.0	33.3	70.8	47.5	77.0	58.5	74.5	50.0	61.2	33.2
30	41.4	32.2	27.8	8.8	0.2	-21.5	3.8	16.3	11.0	1.3	..	..	52.0	33.0	68.3	39.0	80.2	44.5	76.0	52.0	77.5	53.8	67.0	40.0
31	..	..	19.2	5.8	..	..	6.1	21.1	5.5	22.0	..	..	57.5	33.0	..	..	81.0	49.0	..	..	60.0	50.5	68.5	37.0

APPENDIX No. 41.

REPORT OF H. W. SELBY, D.L.S.

SURVEYS IN NORTHERN ALBERTA.

TORONTO, March 9, 1907.

E. DEVILLE, Esq. LL.D.,
Surveyor General,
Ottawa, Ont.

SIR,—I have the honour to submit the following report on the survey of township outlines and the subdivision of those lands which in my judgment should be made available, by survey, for immediate settlement at or near the westerly end of Lesser Slave lake, under your instructions dated March 5, 1906, and additional ones sent to Lesser Slave Lake in the following August.

I left Toronto March 8 for Edmonton, where my party was organized, and on March 20 we left for Lesser Slave Lake, where we arrived April 3.

The territory covered by my instructions, namely, that lying to the west of Lesser Slave lake, is composed of a rich soil varying in depth from 3 inches to 12 inches of black loam, upon clay subsoil generally, and lies with a gentle descent towards the east and south. It is very well suited to the purposes of agriculture, mixed farming or stock-raising. Large quantities of hay can be cut and made upon the flat country adjoining the lake, and the higher ground provides abundant pasture for stock on the prairie spots, and amongst the poplar and willow bush which in many places is quite open.

Lesser Slave Lake is now the distributing point for all freight which is required north and west as far as Fort Graham, Fort St. John, Fort Vermilion and Peace River district. As a result a certain quantity of oats is used by teams employed in the freighting business, and, except the small quantity used in stall feeding, there is no market for any more, at a profit. However, when once a railway is constructed, within any reasonable distance, there should be large quantities of oats, wheat, barley and vegetables of all kinds grown, which the soil is, in a high degree, capable of producing. Much speculation is indulged in, as to the future, with regard to the climatic conditions. Frosts occur every month, but this does not affect vegetation, especially that which has become acclimated. Grain and vegetables sown early in the season do not suffer, and ripen before the severe frosts come. Cultivation of the soil will change the climate, and after three years experience in that country my opinion is, that successful farming can be carried on in this district, but until there is an outlet for the produce there is not likely to be a large influx of settlers.

A settlement survey was made in the year 1901, which took in the greater portion of the prairie land surrounding the westerly end of Lesser Slave lake. Many of the lots so surveyed have had settlers living upon them at different times, but with the exception of those owned by the Roman Catholic and English missions, and three old settlers, nothing was grown that was for sale this year, there being no market for it.

The land adjacent to this settlement survey has been subdivided this season, and it is the general opinion that it will soon be occupied after a market has been established.

In addition to these lands, I subdivided township 74, range 16, and parts of townships 74 and 75, range 17, known locally as Prairie River Settlement. In order to do this the outlines of townships 73, ranges 16, 17 and 18 were surveyed. In townships 74 and 75, ranges 16 and 17, several settlers were found with good substantial improve-

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ments. This district is essentially farming land on account of the richness of the soil, while the excellent condition of the stock bears witness to the fattening qualities of the grass and peavine or vetch.

East and West Prairie rivers flowing from the southeast and southwest, join South Heart river flowing from the north, near the northeast corner of township 75, range 17. Each of these rivers flows in a channel about 100 feet wide and within banks from five to ten feet high. The water generally is shallow and seldom over a chain wide, but the sudden melting of the snow, or a two or three days' heavy rain causes the water to rise and almost fill each channel. Had each river an independent outlet to the lake, no flood would take place, but it is impossible for this extra quantity of water to escape through one outlet and the result is the overflowing at certain points, more particularly the north part of township 75 and the south part of township 76, range 16. This flooding is caused to a smaller extent at other parts of these rivers through the large quantities of driftwood becoming jammed, deflecting the water overland and around the obstruction until it again reaches the main channel.

The clearing of this driftwood out of the rivers will render the country alongside less liable to flooding and land now looked upon as valueless will become as good as the best.

There are two very good wagon roads between Lesser Slave lake and the settlements, but bridges will have to be built, to prevent the isolation of settlers for certain periods, at the time of flood, or of the formation and breaking up of the ice in the fall and spring.

The country adjoining the 19th and 20th base lines has been fully described in the reports of survey, and it may be well to add that in this part of the country, as in the most of the townships where bush predominates, conditions will greatly change when the land is cleared and cultivated.

Diligent inquiry and watchfulness failed to elicit any information regarding the proposed route of any railway except that of the Grand Trunk Pacific, which, being near Sturgeon lake, was out of my district.

The irregular boundaries of the several settlement surveys were traversed, and straight lines substituted therefor and permanently marked upon the ground.

Having completed this work I left for Edmonton, discharged my party and arrived in Toronto on the night of December 22, 1906.

I have the honour to be, sir,
Your obedient servant,

HENRY W. SELBY, *D.L.S.*

APPENDIX No. 42.

REPORT OF P. G. STEWART.

EXPLORATION OF THE COUNTRY WEST OF THE HUDSON BAY EXTENSION OF THE CANADIAN
• NORTHERN RAILWAY, TO THE PAS ON SASKATCHEWAN RIVER.

BRITANNIA BAY, ONT., Feb. 21, 1907.

E. DEVILLE, Esq., LL.D.
Surveyor General,
Ottawa.

SIR,—On August 16, I left Etoimami, the Hudson bay junction on the Canadian Northern railway. After setting up our tents I gathered what information I

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could about the general character of the district I was sent out to explore. From what I could learn it was claimed to be very soft, marshes and muskegs being numerous, especially in the northern section. After getting this information, I considered it advisable to move into 'Thirtymile' creek, and examine the softest ground during the dry weather. Therefore we started by wagon on the right-of-way, following the sand ridge for twelve miles. This ridge is thickly wooded on both sides with small jack-pine, poplar and spruce. We then left the right-of-way and followed the wagon road leading to the north for three miles when we arrived at Overflowing river, where we camped over night. Very hot day.

Aug. 17. This morning we crossed Overflowing river, when we turned east for two miles. We then came to the right-of-way again, and after following this up for two miles, we again turned to the north. The right-of-way here turned to the northeast going into Muskeg swamp; both sides are well timbered with spruce, jack-pine, poplar, tamarack and some scattered white birch of no value, poplar being the prevailing timber. Marshes are numerous. One lake that I noticed, called Ruby, is half a mile wide and five miles long. These marshes are from half a mile to three miles long and from four hundred to six hundred feet wide, they contain water from one to four feet deep, and are surrounded with what they call water grass of no value for feeding purposes. At 2 p.m. we arrived at 'Twentymile' creek, about two miles west of the right-of-way. We passed through some very good spruce and tamarack with gaps of small poplar and jackpine. After taking lunch we proceeded for one and one-half miles. The ground is well timbered with spruce, poplar and jackpine on both sides, poplar being the prevailing timber, the others following in the order named. Marshes and muskegs still continued with gaps of alder, scrub spruce and tamarack of no value. At 7 p.m. we arrived at Fork creek where we camped over night. It rained nearly all day.

Aug. 18. We started at 6 a.m., going through some good large spruce, tamarack and jackpine and arrived at 'Thirtymile' creek at 2 p.m. The last four miles covered is all burnt and a second growth of poplar covers the ground in abundance. Turning east at this point and following down the south bank of the creek for three miles we arrived at the right-of-way again. Rained all forenoon.

Aug. 19. This morning we started at 6 o'clock, going west on the north side of 'Thirtymile' creek. This creek is twenty feet wide at the bottom, and runs in an easterly direction flowing at the rate of three miles per hour. It has an average depth of seven inches; the banks are six feet high and very steep. It would be a fine creek for driving logs. We went through some very large spruce, poplar and tamarack, spruce being the prevailing timber. At noon we passed out of the green timber and into the burnt country, continuing on for two miles through Muskeg swamp, timbered with small scrub spruce and poplar of no value. At 2 p.m. we arrived at the foot of Pasquia hills. After going up a very easy slope for half a mile the hills got very steep, with small poplar very thick. Continuing up for five miles we arrived at the summit about six or seven miles from the foot. On the north side of the valley of 'Thirtymile' creek, the water runs very swiftly. The valley is about six hundred feet wide and one hundred and fifty feet deep. For a long distance to the west, north and east, the country seemed to be all burnt and the Indian who was with us said the burnt district continued as far west as Carrot river. The day was cloudy and dull.

Aug. 20. This morning we travelled north on the top of the hills. Gullies are numerous and average from one hundred and twenty to one hundred and fifty feet deep and from two hundred to six hundred feet wide. In the afternoon we reached the timber again. Very hot day.

Aug. 21. This forenoon we came through some good spruce and tamarack but considerably scattered, tamarack being the prevailing timber. This afternoon spruce and tamarack continued, with openings of spruce and tamarack of no value. In the evening we arrived at the right-of-way. Very hot day

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Aug. 22. This morning we went north between the right-of-way and the meridian line. After travelling for two hours through some spruce and tamarack we came to a small marsh of about four acres, covered with good hay. Passing through small spruce and tamarack for the next two hours, we came to good spruce and tamarack again. This afternoon we did not see much timber of any value, the ground gone over being mostly covered with small spruce, tamarack and brush. Very hot day.

Aug. 23. To-day I am examining the timber west of the meridian. We met with one marsh of about twenty acres, also one muskeg of about one hundred acres covered with brush and eight inches of water. This afternoon we saw considerable good spruce and tamarack. Fine day.

Aug. 24. To-day we travelled north of the timber examined yesterday and found considerable burnt country with small spruce and jackpine of no value. Fine day.

Aug. 25. To-day we moved eight miles north on the meridian line, and also travelled west toward the hills. Saw nothing but open muskeg. Big thunderstorm to-day.

Aug. 26. To-day we went west of the meridian line and encountered small poplar, very thick slash and windfalls, the whole country being muskeg, with two feet of water in places. In the afternoon we reached the top of the hills. The character of the ground is about the same as along 'Thirtymile' creek, gullies are numerous and from one hundred and twenty to one hundred and sixty feet deep and from three hundred to six hundred feet wide and very steep. The ground gone over to-day is burnt and timbered with small poplar of no value. Cloudy to-day, with high wind. Heavy frost last night.

Aug. 27. This morning we passed through large poplar, some spruce and some scattered white birch. Poplar is the prevailing timber. From the top of the mountains we could see a long distance; to the east the country is open with nothing but scrub spruce and jackpine of no value; there is also a large portion of it burnt. We also could see a long ridge of large timber to the north which seemed to be running in a northeasterly direction. We are meeting with some good spruce, but scattered. Poplar is the prevailing timber, there is also some good white birch and scattered balsam. Fine day.

Aug. 28. This morning we went west on the mountains. The timber was about the same as yesterday, with some muskegs from five to twenty acres wooded with small spruce of no value. The character of the ground was the same as yesterday, with gullies from one-quarter to one-half a mile wide and from one hundred and twenty to one hundred and seventy-five feet deep, but very easy of ascent. Fine, but very hot. Heavy frost last night.

August 29.—This morning, one hour after leaving, we came to the upper Pasquia river, which runs in an easterly direction through a large valley nine hundred feet wide and one hundred and forty feet deep, well timbered with large spruce and poplar, the latter being the prevailing timber. The bottom of the stream is sandy, with quite a quantity of boulders, and is thirty feet wide; it is very swift, and has an average depth of fourteen inches; the banks slope gently. We followed down the river on the south side. Large poplar and scattered spruce continued, with some balsam and white birch, very scattered. In the evening we reached the foot of the hills. Some rain to-day.

August 30. This morning we went east along the river. We found large poplar in abundance, with some small bunches of spruce and also some very large scattered trees. The belt of timber on the south side is half a mile wide and the trees are very large; the spruce is very scattered. Showery to-day.

August 31. This morning, half an hour after starting, we came to a bunch of jackpine half a mile wide by half a mile long. At 11 p.m. we reached the meridian line. Going north on the left side there is a small lake about half a mile long and about six hundred feet wide; the land is rolling on the south side, with some scattered jackpine and spruce of a good size. On the west side is a small jackpine plain, and on the southwest side is an alder swamp that seems to extend to the hills. We followed the river for three miles and crossed the meridian line nine times inside of a mile. There

is some very large spruce, but scattered; also poplar in abundance, with considerable white birch of a good size. I am going to examine the country west of the meridian through to Carrot river. To-night we are about the northeast corner of township 51. Cloudy, with wind.

September 1. This morning we went west towards the hills. The ground along both sides of the meridian at this point is covered with small jackpine of no value; for two miles north and south, and for two and one-half miles east and west, the land is sand, with some granite boulders. At one mile west of the meridian and one mile north of Pasquia river there are three small lakes surrounded with brush. After leaving these lakes to the east about half a mile we came to a swamp covered with scrub spruce for half a mile, then with good spruce and poplar for two miles to the foot of the hills. The timber increased in size, poplar still being the principal variety, with some scattered birch and balsam, and some muskegs covered with scrub spruce. The hills were very easy and rolling. Fine day.

September 2. This morning we continued westward. Some spruce and poplar of a good size were still in evidence. Before noon we reached the top of the hills and, turning north, we travelled on the hills about four miles. Poplar is the prevailing timber. We crossed a marsh one mile by one and one-half miles wide, covered with good hay. Fine day.

September 3. We travelled east to-day, descending the hills. The timber on the face of the hills is principally poplar, with some scattered spruce and birch. All afternoon we went through a heavy growth of spruce. Cloudy, with high wind.

September 4. This morning we passed out of the spruce into a tamarack swamp. Considerable of the timber in the swamp is dry, but sound; the green timber is large. The extent of the swamp is about one by one and one-half miles. A great many railway ties could be made here. Cold and cloudy.

September 5. We travelled east this morning to the meridian. Good spruce was still plentiful. On reaching the meridian we travelled north along the east boundary of township 52, range 1. Both sides were well timbered with large spruce, scattered balsam and large poplar. Bright and cold.

September 6. To-day we went west on township 52. There was an abundance of spruce and tamarack all forenoon. At 11.30 we came to a muskeg about twenty acres in extent, covered with small spruce of no value. After passing this muskeg we came to good spruce. During the afternoon we passed out of the thick spruce into some scattered spruce and large poplar, with abundance of white birch. Very hot day.

September 7. This morning we continued westward. Gullies are numerous, from fifty to two hundred feet wide and from fifteen to forty feet deep, steep in some places and in others with easy slope. At noon we turned north. Scattered spruce, poplar and white birch continued. We came to a small lake surrounded with birch and scattered spruce. A small creek runs out of this lake. I could see a long distance to the east. From the foot of the hills the country was all open muskeg, with numerous small lakes. By 8 p.m. we had come north about eight miles. Poplar and spruce continued; the spruce was very scattered and the poplar large and plentiful, with abundance of white birch. Rained hard all day.

September 8. This morning we reached the highest point on the hills. There is a sand bank here about thirty feet above the general level and half a mile long, with an almost perpendicular slope. I could see an abundance of large spruce and jackpine to the west and the valley of Carrot river to the north. At 2 p.m. we descended from the north end of mountains. Large spruce was plentiful, with considerable large balsam. Cloudy and dull.

September 9.—We continued northward this morning. The slope of the hills was very easy and well wooded with spruce, poplar and some scattered balsam and birch. At 4 p.m. we came to the south bank of Carrot river, which is about two hundred and twenty feet wide with banks fifteen feet high and very steep; it seems to be pretty deep. Quite a number of Indians were camped on the north side. On going down the

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north side we found considerable large spruce and poplar, but somewhat scattered. Some rain to-day.

September 10.—This morning we went north towards Saskatchewan river. By noon we had found no timber of any value, the country being all swamp and marshes with considerable good hay. The Indians say there is no timber between Carrot and Saskatchewan rivers in this space. Cold and windy.

September 11.—We got back to Carrot river at 9 o'clock last night; to-day we travelled down the north side of the river. Quite a quantity of large spruce was encountered, but considerable of it has been blown down. I saw at least 12,000,000 feet of spruce to-day that will average one hundred feet for lumber and about 2,500,000 for pulp; also 6,000,000 feet of poplar that will average ninety feet for lumber and about 1,500,000 for pulp. Geese and ducks were very plentiful. Fine day.

September 12.—This morning we made a float and crossed to the south side. Travelling westerly we found poplar in abundance and some large but scattered spruce. Half a mile south the country is marsh and muskeg swamp covered with scrub, spruce brush and some hay. At noon we came to a large space with considerable large poplar. By night we reached the meridian. We saw to-day about 7,000,000 feet of spruce for lumber that will average ninety feet to the tree and 2,000,000 feet for pulp; the poplar will average seventy feet to the tree with about 8,000,000 feet for lumber and 2,500,000 for pulp.

The following statement is an estimate of the timber I have examined north of 'Thirtymile' creek and west of the second meridian. I consider I have gone over ten miles by twenty-four miles, and a total of two hundred and forty square miles. Taking one hundred and forty miles out for waste land and bad timber, we have left one hundred miles of standing timber divided as follows. I have measured in different places 74 acres and found the average dimensions as follows:—

Spruce suitable for lumber (dimension 56 ft.)....	24,000,000	ft. B.M.
Spruce suitable for pulp.. .. .	40,000,000	"
<hr/>		
Total.. .. .	64,000,000	"
Poplar suitable for lumber.. .. .	100,000,000	"
Poplar suitable for pulp.. .. .	15,000,000	"
<hr/>		
Total (dimension 90 ft.).. .. .	115,000,000	"
Tamarack for lumber (dimension 46 ft.).. .. .	9,000,000	"
Balsam suitable for lumber (dimension 40 ft.).. ..	2,000,000	"
Balsam suitable for pulp.. .. .	4,000,000	"
<hr/>		
Total.. .. .	6,000,000	"
Jackpine for lumber (dimension 42 ft.).. .. .	4,000,000	"
Jackpine for pulp.. .. .	5,000,000	"
<hr/>		
Total.. .. .	9,000,000	"

	Ft. B.M.
Spruce.....	64,000,000
Poplar.....	115,000,000
Tamarack..	9,000,000
Balsam..	6,000,000
Jackpine..	7,000,000
White birch..	6,000,000
	<hr/>
Total.....	207,000,000

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September 13.—To-day we went south on the meridian. Marshes, muskegs and small lakes were numerous. We reached the southeast corner of township 53, this evening, and saw no timber of any value to-day, with the exception of one small spruce ridge containing about 1,000,000 feet suitable for pulpwood. Fine day.

September 14 and 15.—The last two days I have been travelling east of the meridian and east of township 52. Shortly after starting yesterday morning we passed a small lake surrounded with long weeds and scrub spruce, one mile wide and one mile long. Continuing south and east I found spruce and large scattered poplar with openings of scrub spruce and tamarack. During the last two days we have measured twelve acres in different places, and found the average dimension of spruce sixty-four feet, board measure, to the tree, or a total of 8,500,000 feet for lumber and about 2,000,000 feet for pulp. The average dimension of the tamarack is fifty feet B.M. to the tree, or a total of 4,500,000 feet. A great many tamarack railway ties could be made here. The average dimensions of the poplar is one hundred and twenty feet to the tree or a total of 15,000,000 feet B.M. for lumber and 2,000,000 for pulp. Raining hard the last two days. We carried no tents, as they were too much to carry through the country with little help.

September 16.—This forenoon at 9 a.m. we reached Pasquia river, about five miles east of the meridian. The river at this point runs in an easterly direction and is thirty-five feet wide with steep banks about twelve feet high, has an average depth of 14 inches of water, and runs very swiftly. I could see for a long distance south and east, a low swampy country, covered with brush; we followed down the north bank for three miles, when we came to a lake through which the river runs. On the north side of the lake we came to spruce timber. Showery to-day.

September 17.—I have been examining this spruce to-day. I measured four acres in different places and found the average dimension of trees to be sixty-one feet, or a total of 6,200,000 feet B.M. for lumber and about 2,000,000 feet for pulp. Dimension of poplar seventy-eight feet, 3,000,000 feet B.M. for lumber and 1,500,000 for pulp.

September 18.—Going east towards the railway the country is open, low and swampy with brush and windfalls. At 3 p.m. we came to Little Pasquia river and reached the railway at 5 p.m. The last four miles is low and wet, covered with scrub spruce and moss. Continuing north on the railway, the country is all swamp with the exception of a few low jackpine hills. We are camped to-night four miles south of Seventy-mile store. Cloudy and dull.

September 19.—To-day we travelled on the right-of-way to The Pas. On our left a narrow strip of poplar and spruce was seen. The land was rolling with ridges eight to fifteen feet high, and from fifty to fifteen hundred feet wide. Between the ridges are muskeg swamps, which continue for sixteen miles. For the last two miles the land is sandy and covered with small poplar and jackpine of no value. The dimension of the spruce is about forty-five feet with a total of 1,500,000 feet B.M. for lumber. The spruce suitable for pulp would measure about 3,000,000 feet. The dimension of the poplar is about fifty-five feet with a total for lumber about 2,000,000 feet, and for pulp about 5,000,000 feet. Rained all day.

September 21.—We left The Pas by canoe, going up Pasquia river. The stream for three miles is two hundred feet wide and has a depth of three feet of water; the banks are from six to eight feet high and very steep, and are covered with a strip of small willow brush. Outside of this, the land is low and covered with rich grass, in which we saw countless geese, also black and other ducks; in fact this seems to be a sportsman's paradise. About half a mile farther up the stream it runs very swiftly, with about four inches of water and very soft bottom. Most of the distance for another mile was made by poling, the current being too swift and strong to be overcome by paddling. The banks along here are about fifteen inches high; for two hundred acres on each side the country is very level with not a spear of grass or anything growing. Near the lake the river is two hundred feet wide but very shallow. The land on both sides is very low and covered with rich grass for one mile wide on

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the east side and as far as I could see on the west. The river for the next ten miles is a beautiful stream, the banks on each side being covered with a narrow strip of willows. At 3 p.m. we arrived at 'Seventy-mile' store. The river at this point is half a mile west of the right-of-way. Continuing up stream this afternoon the country had the same characteristics as the lower tract, except that the poplar on the north side is somewhat larger. Fine day.

September 22.—This morning I crossed to the east side and travelled between the river and the right-of-way. The country is very low and swampy. Continuing towards the right-of-way we came to a strip of good spruce, poplar and tamarack. This strip of timber crosses the right-of-way about six miles north of 'Fiftymile' store and seems to continue east for a good distance. The ridge on the west side is half a mile wide and three miles long. I measured four acres in different places and found the average dimension of spruce trees to be sixty-three feet with a total of 1,500,000 feet B.M. for lumber and about 1,000,000 feet for pulp. The average dimension of the tamarack is forty-nine feet to the tree, and a total of 275,000 feet B.M. The poplar is scattered and will average per tree about eighty feet and a total of 800,000 feet B.M. for lumber. Fine day.

September 23.—This morning half an hour after starting we crossed a big floating muskeg for two miles, with water to the knees. At 9 a.m. we came to a lake about one mile wide and one and one-half miles long, surrounded with small spruce and poplar. Continuing south we came to a spruce and jackpine ridge and on travelling around it I found it contained an area of about four hundred acres. I measured four acres in different places, and the average dimension of the spruce was forty-five feet to the tree with a total of 1,000,000 feet B.M. for lumber and about 600,000 feet for pulp. The average dimension of the jackpine was forty-eight with a total of 700,000 feet B.M. for lumber and 300,000 feet for pulp. On crossing a long narrow floating muskeg to the southwest we came to another small ridge of spruce and jackpine, about two hundred and fifty acres in extent. I measured two acres and found the average dimension of spruce trees to be fifty feet and a total of 1,000,000 for lumber, 400,000 for pulp. The average dimension of the jackpine was fifty-two feet with a total of 600,000 feet B.M. for lumber and 300,000 for pulp. At 1 p.m. we reached the east bank of Little Pasquia river and turned northeast. In the afternoon we reached Pasquia river. The poplar along both sides is plentiful but small, with considerable good but scattered spruce. Fine day.

September 24.—This forenoon we travelled on the north side of the river where there is considerable large spruce and poplar. It is impossible to travel in this district as it is low land and almost covered with water. I have decided to leave it until we get frost. At 2 p.m. we arrived back at the river. Going along the south bank we passed through poplar with gaps of alders and low swampy land to the left. The dimension of the spruce is about fifty feet with a total of 500,000 for lumber with 500,000 for pulp. The dimension of the poplar is about forty feet or a total of 4,000,000 feet for pulp. At 5 p.m. we arrived at the mouth of Little Pasquia river. At this point the main river makes a decided bend to the north, and as the course is fairly straight a charming vista is open to our view; the peaceful, winding river is fringed with meadows of tall grass, and bounded on either side by a good spruce ridge. This afternoon we went up Little Pasquia river. The banks are well timbered on both sides, but with only a narrow strip of spruce, poplar and some jackpine. The land is rolling; the hills will average about twenty feet high, very steep in some places and easy in others. The valleys are from fifty to two hundred feet wide. The river for five miles up from the mouth is fifty feet wide, with high and very steep banks. The water is running about two miles per hour, and has an average depth of eight inches. Cloudy, with strong west wind.

September 26.—Half an hour after starting this morning we came to rapids with very little water. These rapids are from one hundred to five hundred feet in length and continue with gaps of steady water up to the right-of-way, a distance of about ten miles. The bottom consists of small round stones, with very few boulders of any size.

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At twelve o'clock we came to a strip of burnt timber about one-half mile wide. To-day we examined the strip of timber along both sides of the river and found that the strip will average about two hundred feet wide, on each side, with gaps of alders and several small creeks coming in on the west side. Outside this strip of timber the land is low and swampy and there is no timber of any value. The river can be made into a good stream for driving logs by building a dam above the railway bridge. It is about fifteen miles from the mouth up to the railway. The dimension of the spruce is about fifty-five feet to the tree and a total of 3,000,000 feet B.M. for lumber and 4,000,000 feet for pulp. The dimension of poplar is sixty-five feet B.M. and a total of 2,000,000 feet for lumber, and 1,500,000 feet for pulp. Jackpine is very scattered and has a dimension of about forty feet, with 300,000 feet B.M. for lumber, and 300,000 feet for pulp.

September 27.—To-day we went down the right-of-way. Both sides are low and swampy. For a distance of five miles south of Little Pasquia it is all open muskeg. We arrived at Thirtymile creek at 8 p.m. We saw no timber along the line to-day of any value. There are deposits of limestone in several places along the right-of-way, between Thirtymile creek and Fiftymile creek. It seemed to be all in small boulders and some of the railway men informed me that it was of no value.

ESTIMATE OF STANDING TIMBER EAST OF THE SECOND MERIDIAN AND NORTH OF THIRTYMILE CREEK AND SOUTH OF PASQUIA RIVER TO THE PAS.

I have measured forty-one acres in different places and found the dimensions as follows:—

	Feet, B.M.
Spruce suitable for lumber, average 55 feet, total.. . . .	23,200,000
Spruce suitable for pulp, average 55 feet, total	13,000,000
	<hr/>
	36,200,000
Poplar suitable for lumber, average 95 feet, total.. . . .	22,800,000
Poplar suitable for pulp, average 95 feet, total.. . . .	14,000,000
	<hr/>
	36,800,000
Jackpine suitable for lumber, average 50 feet, total	1,600,000
Jackpine suitable for pulp, average 50 feet, total	900,000
	<hr/>
	2,500,000
Tamarack suitable for lumber, average 50 feet, total..	4,775,000
	<hr/>
Total..	80,275,000

All the land gone over is low and swampy, with the exception of Pasquia hills, which are all sand. I saw no land of any value for agricultural purposes north of Thirtymile creek.

September 28.—Some frost last night. Travelling south from Thirtymile creek we came to a strip of large spruce and poplar about one-quarter of a mile wide and extending back west about three miles. There is also considerable small spruce suitable for pulp wood. For one mile west of the right-of-way the land is level, and for the next two and one-half miles the land is rolling with gullies about eight feet deep and five feet wide. At three miles from the right-of-way is the north end of the sand ridge that extends to Etoimami. South of this strip of timber there is a strip of burnt timber about one and one-half miles wide. Passing over this, we came to jackpine, spruce and poplar in abundance. At 10 a.m. we came to a large creek running to the east, with a current of six miles an hour. This creek is thirty feet wide and has an average depth of six inches of water. Its banks are three feet high and extend back for fifty feet, where they rise to a height of thirty feet and are very steep. The bottom is gravel and it can be made a good stream for driving timber with very little expense. The Indians say this stream is a continuation of Little Pasquia river. Going up the

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stream for another one and one-half miles, large spruce and poplar is plentiful with some scattered balsam of a good size. Fine day.

September 29.—To-day we followed up the creek. The land is very low, swampy and burnt, with scattered large spruce and balsam. About 9 a.m. we came to the foot of Pasquia hills. The country rises at an easy slope for one-quarter of a mile, is very level for the next one and one-half miles, and then gets much steeper for the next two miles. Here the gullies are about one hundred feet deep and four hundred feet wide and are very numerous. The sides are very easy of ascent and are wooded with small poplar in abundance, but of no value. The river runs through a very large valley six hundred feet deep and two thousand feet wide, with gently sloping sides. Cloudy and dull.

September 30.—Some frost last night. This forenoon we went south on hills for about five miles. The character of the ground was much the same as that gone over yesterday. This afternoon at 1 p.m. we turned east and descended the hills. Going down at easy slopes we reached the foot at 5 p.m. It is very low, wet swampy land, well timbered with spruce and poplar, spruce predominating. Fine day.

October 1.—This morning about one hour after starting we passed out of the spruce and tamarack which continued. We next came to a big marsh about one mile by four miles. This marsh contains considerable water and is covered with water grass. For the next two miles the ground is well timbered with spruce, poplar and some tamarack. Passing out of the timber we came to a marsh about half a mile by one mile, also containing water and water grass. Following for six hundred feet down the creek, which runs out of the marsh, we came to another creek coming in from the southwest. We came also to the sand ridge and wagon road. The ridge is twenty feet high and six hundred feet wide, and is well timbered with large spruce. The timber continues to the right-of-way, a distance of about two miles. This creek is twenty feet wide and has banks four feet high which slope gently. The average depth of water is four inches and the current is six miles an hour. Cloudy and dull.

October 2.—We travelled three miles north this morning on the right-of-way and found spruce and poplar plentiful. Turning west and following up the creek we went for three miles and found abundance of spruce and poplar. At noon we reached the sand ridge and wagon road. At 12.30 we started south on the wagon road and continued for four miles. Both sides were well timbered with large spruce and poplar, and some jackpine. At 4 p.m. we left the wagon road and travelled west. The land was low and swampy with ridges of spruce, poplar and jackpine and open spaces covered with scrub spruce and tamarack. Some rain to-day.

October 3.—At 8 a.m. we reached the foot of the hills. The hills are steep and wooded with scattered large spruce and poplar. The poplar does not look to be very sound. We felled three trees; two were twenty-four inches and one twenty-five inches at the butt. We found them very rotten at the top and shaky at the butt. Continuing we found the hills very steep and covered with brush so thick that it was almost impossible to get through. At noon we reached the top and found spruce and poplar, scattered and not very healthy looking. A large area of the hills here is burnt. Continuing west we found the spruce more plentiful and larger. At 3 p.m. we came to burnt country, and as far west as I could see it is all small jackpine, of no value. Turning south and going through the small jackpine for the next three hours we came to a very large valley four hundred feet deep and 3,000 feet wide. The land is sand with a great many large land slides. Letting ourselves down the bank we found a creek running to the east. It is twenty-five feet wide, with an average depth of seven inches of water and a rapid current.

October 4.—This morning we climbed up the south bank. It is wooded with scattered spruce, poplar and white birch. Going west on the south side we found considerable spruce and large poplar ridges, and a large portion of the country burnt. The land is pretty level. We crossed a few gullies about fifty feet deep and four hundred feet wide. They were steep and timbered with small poplar of no value. At 6 p.m.

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we came to a muskeg where we camped for the night. Some light showers to-day. Moose very plentiful.

October 5.—This morning going east we crossed one gully about 175 feet deep and 500 feet wide. The slope was pretty steep and it was wooded with small poplar and spruce of no value. At 9 a.m. we came to open sand plains, with ridges of large spruce and poplar. At 5 p.m. we came to the creek we crossed yesterday morning running in a southeastern direction. The valley of the creek here is about 40 feet wide at the bottom, and two hundred feet deep and very steep. The creek is about the same size as where we crossed it farther west, but it does not run so swiftly and has a sand bottom. Rained hard all day.

October 6.—At 9 a.m. we reached the foot of the hills. The land is level but low and swampy, with some good spruce and poplar. At 12 o'clock we were in spruce in abundance. We then crossed two open muskegs of about fifty and seventy-five acres respectively, and covered with moss, small spruce and tamarack of no value. At 6 p.m. we were still in the spruce. Rained all day.

October 7.—This morning we passed out of the spruce into a very wet small spruce swamp one mile wide. We next came to an open swamp about half a mile by half a mile, covered with moss, with large spruce and poplar on our right and left. At 2.30 we came to a sand ridge wooded with small poplar and scattered large spruce. The ridge is 10 feet high and 600 feet wide. The east slope descends into a swamp wooded with tamarack and scattered spruce. Still going east the land is low and swampy for one mile. We reached the right-of-way at 5 p.m. The last mile was well timbered with spruce. Some rain to-day.

October 8.—Snowed all day. Remained in camp.

October 9.—This morning we went south on the right-of-way. The timber is small spruce and poplar, suitable for pulpwood. At 9 a.m. we came to Twentymile creek. Going west up the right bank we found the poplar and spruce very scattered, but on the left bank it was very large and plentiful. Proceeding for one and one-half miles we came to a sand ridge about half a mile wide with easy slopes. The creek is thirty feet wide. Its banks are very low on the north side and on the south side they are about 6 feet high with easy slopes. The creek has an average depth of 8 inches of water and runs very swiftly; the bottom is small boulders and gravel. It is a good stream for driving timber. Cloudy, with west wind.

October 10.—This morning we followed up the creek on the right bank. We found large jackpine very plentiful for one mile. Following up the stream for three miles we came to the forks. Proceeding up the right branch we found large spruce and poplar were very plentiful, with spruce predominating, also hazel brush very thick and hard to get through. At 12 o'clock we were still in the spruce. At 4 p.m. we passed out of the thick spruce, and into scattered large spruce and poplar, with poplar predominating. Following up the creek we found the hills on each side about one hundred and fifty feet high very steep on the south side, and easy on the north side, and about ninety feet wide at the bottom. Fine day.

October 11.—We climbed up the south bank this morning and went west for one mile through burnt timber, with scattered ridges of large spruce and poplar. Proceeding southwest for two miles we came to a marsh covered with brush. Crossing the marsh to the southwest we came to large poplar and spruce, poplar being the prevailing timber. The land is level and sandy and has also much small poplar, which, however, is of no value. We next crossed three open muskegs of about five, ten and twenty acres respectively. The land covered to-day is burnt in many places. Fine day.

October 12.—This morning we travelled west for four miles. It is nearly all burnt country, with some scattered spruce and poplar. At 4 p.m. we came east crossing some gullies, from twenty-five to one hundred feet deep, and from one hundred to six hundred feet wide with easy slopes. These gullies are wooded with small poplar and scattered large spruce. Fine day.

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The timber area north of Twentymile creek and south of Thirtymile creek is not over five miles.

	Ft. B.M.	Ft. B.M.
		Dimension 56 ft.
Spruce suitable for lumber.. . . .	9,000,000	
Spruce suitable for pulp.. . . .	10,000,000	
		19,000,000
		Dimension 78 ft.
Poplar suitable for lumber.. . . .	15,000,000	
Poplar suitable for pulp.. . . .	10,000,000	
		25,000,000
		Dimension 50 ft.
Jackpine for lumber.. . . .	4,000,000	
Jackpine for pulp.. . . .	3,000,000	
		7,000,000
		Dimension 45 ft.
Tamarack for lumber.. . . .		1,000,000
		Dimension 40 ft.
Balsam for lumber.. . . .	200,000	
Balsam for pulp	300,000	
		500,000
Total.. . . .		52,500,000

October 13.—One hour after starting this morning we came to the south branch of Twentymile creek. It runs a little north of east and is about the same size as the west branch. It has an average depth of eight inches of water, the current is swift and it is a good creek for driving timber. The valley is about one hundred and twenty-five feet deep and pretty steep, and is about seventy feet wide at the bottom. The valley is wooded with scattered spruce, poplar and some birch. The country for the next six miles is timbered with poplar and scattered spruce. Showery to-day.

October 14.—At 8 a.m. we reached the summit of the mountain. From there we could see a large green country to the east, seeming to extend for some distance east of the railway line. We could also see a lake about twelve miles to the southeast. I presume this is Leaf lake. It is surrounded for a great distance with large timber. Descending the mountains through large spruce and poplar for one mile we came into large jackpine for another mile. Still following down the stream we found the country well timbered with large spruce. At 2 p.m. we came to a fork. From there we went southeast for two hours through good sized spruce and poplar with gaps of open muskeg covered with scrub spruce and tamarack. We reached the sand ridge and wagon road at dark. Some rain to-day.

October 15.—The sand ridge here is five hundred feet wide and twenty feet high, and is wooded with small spruce and poplar suitable for pulpwood, also some jackpine of no value. After leaving the ridge large poplar is plentiful, with some good sized spruce and tamarack. The poplar extends to the right-of-way, a distance of about two and one-half miles. We went south on the right-of-way for three miles and found it timbered with scrub spruce and tamarack. Fine day.

October 16.—Going west this morning for one and one-half miles through swamp and scrub spruce, we came to a tract of country about one and one-half miles in extent covered with spruce, large and plentiful. Continuing we came to a jackpine ridge about five hundred feet in width wooded with small timber suitable for pulpwood, after this we came to large spruce again for another mile and reached the same ridge and wagon road at 5 p.m. Fine day.

October 17.—This morning after crossing a marsh covered with water grass and containing twenty inches of water we came to large spruce again in abundance for

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three miles. We then crossed a small open muskeg for one-quarter of a mile, and came into country covered with scattered spruce with considerable poplar. This lasted for about a mile till we came to the foot of the hills. Fine day.

October 18.—Proceeding west this morning we went up hills with a gentle rise. The poplar was plentiful with scattered large spruce and very thick hazel brush. Continuing for two hours, at 9 a.m. we reached the top of the hills, which were covered with large spruce and poplar. At noon we came to an alder swamp with a small stream running south. At 5 p.m. we came to a muskeg covered with scrub spruce. Continuing we passed through large spruce in bunches and scattered poplar. The land covered this afternoon was level and swampy. Fine day.

October 19.—Going west this morning for one mile through a small spruce swamp, we came to a burnt country with scattered ridges of good large poplar. Spruce is not very plentiful. At noon going south for three miles we crossed three steep gullies with an average of 75 feet in depth and 450 feet in width. At 10 a.m. we came to the west branch of Overflowing river, running in an easterly direction and very steady. The river is 20 feet wide and the water is 15 inches deep. The valley is 40 feet deep and 400 feet wide and has easy slopes which are timbered with scattered spruce, poplar and some white birch. We crossed over to the south side and went through scattered spruce and poplar for two miles. A great deal of the land has been burnt over. We came to the south end of the mountain, and from there could see a long distance to the south and west. Marshes and muskegs are numerous. At 4 p.m. after going east on the top of the mountain for two miles we came to the west branch of Overflowing river again. Fine day.

October 20.—Going east this morning we found the brush hard to get through. The spruce and poplar is large but scattered. At 2 p.m. we descended from the mountain. The mountain side was rolling and had an easy slope. The valley of the river is not so large as it is farther west. We reached the foot of the hills at dark.

October 21.—This forenoon we followed a large spruce and poplar ridge. On the south is a big alder swamp. At noon we came to the forks. The east and west branches are about the same size. The main stream below the forks is 40 feet wide. The banks are 15 feet high and very steep. The water is running at the rate of four miles an hour and has an average depth of 2 feet. This afternoon we went in a northeasterly direction. For the last two miles we met with scattered large spruce and poplar. At 2 p.m. we came to a swamp half a mile in extent and covered with considerable water. We then came to a burnt country; the land is level and sandy. Wolves are numerous. Fine day.

October 22.—One hour after starting this morning we came to an open muskeg, with 8 inches of water and extending for two miles. We then came to a sand flat three miles in extent and covered with small poplar of no value. At 5 p.m. we came to Overflowing river, two miles west of the right-of-way. The river along here is flat rapids, with an average depth of 10 inches of water. The bottom is very stony with a considerable quantity of large boulders. It is a good river for driving timber. At 5.30 we reached the sand ridge and wagon road. The ridge here is 1,000 feet wide and 25 feet high, and is timbered with scrub, poplar and jackpine. The bank of the river is 15 feet high and is very steep. Fine day.

October 23.—We reached the right-of-way at 8.30 a.m. There is no timber of any value between the right-of-way and the wagon road. We went south on the right-of-way for three miles, then turned west and crossed a marsh at the north end of Ruby lake covered with water grass and considerable water. After crossing the marsh we came to small poplar, which continued for four miles. We then came to another marsh which is about one mile by three miles and is covered with brush and water grass. Then for two miles spruce was very plentiful and following this came a big muskeg three miles by four miles, covered with moss and with water to the knees. Going from there in a northwesterly direction we came to the south fork of Overflowing river, about one mile west of the forks. We also came to the new limit line,

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running east and west. Going up on the south bank of the river, we found spruce and poplar very plentiful for two miles, the last mile being chiefly spruce. After this we came to a muskeg two miles by three miles covered with moss and scrub spruce, and surrounded by ridges covered with scattered large spruce and poplar. Fine day.

October 24.—We continued up the south bank through spruce and poplar for four miles. After going for three miles the timber became very scattered and here the river takes a decided bend to the south. We went on for two miles more and continued to find scattered spruce and poplar. Fine day. The timber area south of Twentymile creek and north of Overflowing river is about eight miles square.

	Ft. B.M.	Ft. B.M. Dimension 60 ft.
Spruce suitable for lumber..	15,000,000	
Spruce suitable for pulp..	9,000,000	
	<hr/>	24,000,000
		Dimension 100 ft.
Poplar suitable for lumber..	20,000,000	
Poplar suitable for pulp..	15,000,000	
	<hr/>	35,000,000
		Dimension 40 ft.
Jackpine suitable for lumber..	1,500,000	
Jackpine suitable for pulp..	2,000,000	
	<hr/>	3,500,000
		Dimension 40 ft.
Tamarack suitable for lumber..		2,000,000
		<hr/>
		64,500,000

October 25.—This morning we crossed to the west side of the river. The water is 3 feet deep and very steady ; it is 25 feet wide; the banks are 15 feet high and very steep. Continuing west we passed a small lake to the east, one mile by one and one-half miles, surrounded with good hay, and with a spruce ridge to the north. Going west the timber continued all afternoon. The ground covered to-day is low and swampy. Fine day.

October 26.—We travelled west to-day through groves of spruce, scattered poplar and opening tracts of scrub spruce and tamarack. The ground covered to-day is swampy and wet. At 5 p.m. we came to an open muskeg with eight inches of water, and covered with scattered scrub spruce. Fine day.

October 27.—We went south this morning through scattered spruce and poplar and considerable spruce. At 10 a.m. we came to the south branch of Overflowing river again. Both sides are covered with alder for a space of one thousand feet. The banks are twenty feet high and very steep. The stream is twenty feet wide and has an average of six inches of water and a current of two miles an hour. At 11 a.m. from the south side of the river, we went east through spruce and poplar. Poplar was the prevailing timber to-day. Land low and wet. Fine day.

October 28.—We went east this morning through country where spruce and poplar is plentiful with some scattered tamarack. We crossed three muskegs having an average of twenty acres each. The land is low and swampy. At 6 p.m. we reached Ruby lake about the centre on the west side. For the last two miles the spruce is thick, but not very large. Snowing and wet all day.

October 30.—We came to Etoimami and stayed there as it snowed and rained all day.

October 31.—We went west along the railway for twelve miles. The land was all swamp and the timber was principally poplar with some spruce and scattered tamarack.

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At 4 p.m. we were going north through a low swamp with water six inches deep, and broken by small poplar ridges. The spruce is very scarce; some has been cut. Cloudy and cold.

November 1.—Going west this morning we crossed a creek running in a southeasterly direction. I presume it is Fir river. It is fifty feet wide, has banks from eight to ten feet high, an average depth of ten inches of water, and a current of four miles an hour. Going east through scattered poplar and spruce for two miles, we came to a marsh surrounded with good grass and containing fifteen inches of water. Cloudy and cold.

November 2.—We travelled to-day in a northeasterly direction through thick poplar and small spruce. We crossed two muskegs covered with water and moss to the knees. The country covered to-day is low and swampy, and much the same as that covered yesterday. It is fairly well timbered with poplar, some scattered spruce and a great quantity of small stuff of no value. At 5 p.m. we reached Etoimami.

Estimated quantity of standing timber south of Overflowing river and north of Etoimami:—

	Ft. B.M.	Ft. B.M. Dimension 54 ft.
Spruce suitable for lumber.. . . .	10,000,000	
Spruce suitable for pulp.. . . .	15,000,000	
	—————	25,000,000
		Dimension 59 ft.
Poplar suitable for lumber	15,000,000	
Poplar suitable for pulp.. . . .	20,000,000	
	—————	35,000,000
		Dimension 40 ft.
Tamarack suitable for lumber.. . . .		5,000,000
		Dimension 36 ft.
Balsam suitable for lumber.. . . .	2,000,000	
Balsam suitable for pulp.. . . .	3,000,000	
	—————	5,000,000
		Dimension 32 ft.
White birch suitable for lumber.. . . .		1,000,000
		—————
		71,000,000
Total estimate north of Thirtymile creek and west of meri- dian line		207,000,000
Total estimate north of Thirtymile creek and east of meri- dian line and south of Pasquia river.. . . .		72,975,000
Total estimate north of Etoimami and south of Overflow- ing river.. . . .		71,000,000
		—————
Total.. . . .		350,975,000

November 3-21.—We were unable to proceed with the work until it froze up. During part of this time I had leave of absence. The rest of the time was spent on the journey to and from home.

November 22.—We left Etoimami by train, on The Pas extension of the Canadian Northern Railway. Snowing and cold.

November 23.—We arrived at Thirtymile creek at 10 a.m. After lunch, we started north and followed the 2nd meridian line for three miles, where we camped over night. Very cold.

November 24.—To-day we went about seven miles. The snow is three feet deep, and there was quite a number of trees across the line. Very cold east wind.

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November 25.—We went about eight miles to-day and camped on the bank of a stream they call Cross creek, about the northeast corner of township 53. Very cold.

November 26.—Cross creek is about fifteen feet wide, has an average depth of three feet of water, and is very steady. This stream runs in an easterly direction and flows into Pasquia river about two miles east of the meridian line. The banks are three feet high and slope gently. To-day we went west up the creek. The banks are well timbered on each side with spruce and some tamarack. On the left, outside of the ridge of timber, which is about four hundred feet wide, is a marsh one-quarter of a mile wide by three-quarters of a mile long. On the south side of the marsh, spruce and poplar are very plentiful. Continuing up the creek we came to three marshes, one extending to the north for six miles and about one-quarter of a mile wide. It is covered with brush, and is wooded on the west side with small tamarack. On the east side the tamarack is still smaller, with open muskeg and scrub spruce. The other two marshes are floating muskegs covered with moss. These marshes are about two miles west of the meridian line. This afternoon we went east on the north side of Cross creek. We went through open muskeg and scrub spruce, and passed several small lakes, reaching the meridian line at dark. Snow three feet deep. Very cold.

November 27.—This morning we went east on the meridian line for two miles and then leaving the line we turned west. We found spruce, poplar and tamarack very plentiful. At noon we reached the foot of Pasquia hills, and went up the mountains for two miles. The ground rose gradually and is covered with spruce in abundance, and considerable large balsam. We went north for the next hour, over some small gullies about 8 feet deep and 30 feet wide, with easy slopes. At 4 p.m. we came to a small creek and camped. This creek is a continuation of Cross creek, and runs through the long marsh running west, two miles west of the meridian line. The valley is 6 feet wide at the bottom. The banks are 8 feet high and very steep. It contains no water. Spruce and balsam are very thick, with scattered poplar and white birch. Bright and cold.

November 29.—We came east to-day on Cross creek. Spruce was very plentiful on each side. There was also some scattered tamarack. At 10 a.m. we came to Pasquia river, about two and one-half miles east of the meridian line. Timber can be driven down Cross creek from the marshes for about four and one-half miles. We went up Pasquia river for four miles. There is a narrow strip of spruce along each side. Here the creek gets very narrow and its banks are densely covered with willow brush. Outside this strip of timber is low swampy land covered with alder and some hay. Very cold with east wind.

November 30.—We went east to-day, through low swampy land, covered with brush and scattered spruce. At 11 a.m. we came to another creek, running in a northerly direction. This creek is 15 feet wide. The banks are 5 feet high and slope easily. We followed this stream up for half a mile, through some scattered spruce on each side. It then gets very narrow and the banks are covered with brush. Turning back we followed the stream down for two and a half miles. For three-quarters of a mile the banks are well timbered on each side with spruce and tamarack. I have measured eight acres in different places, and found an average of 48 feet to the tree for spruce with 4,000,000 feet for lumber and 3,000,000 for pulp. Tamarack averages 42 feet to the tree with 1,500,000 feet B.M. for lumber. Bright and cold.

December 2.—We went north to-day. It was all open country and we saw no timber of any value. Snowed to-day.

December 3.—This forenoon, going north, we crossed four small lakes surrounded by scrub spruce. This afternoon at 3 p.m. we came to another lake a half mile wide by one mile long. Following up this to the north for a half mile we came to a creek surrounded with long yellow weeds, one-half mile farther we came to a big marsh. Snowed to-day.

December 4.—This morning we travelled north through swampy land and some scattered spruce ridges. At 11 a.m. we came to a tamarack swamp, about one mile

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square. This swamp contains about 1,500,000 feet for lumber and the trees will average 48 feet B.M. We came to a small creek at dark. Fine day.

December 6.—We followed down the creek for half a mile, through country covered with small poplar suitable for pulpwood and then came to a lake about one mile wide by one mile long. On the southwest side there is small spruce of no value. On the north side there is a small bunch of spruce covering an area about a half mile wide by half mile long. The average dimension is about 46 feet B.M. with 500,000 feet for lumber and 300,000 feet for pulp, and 1,000,000 feet of poplar for pulp. Very cold day.

December 7.—We went east this forenoon through open muskeg. At noon going southeast we came to a spruce and poplar ridge and followed along this ridge till dark. Very cold.

December 8.—Going in a southerly direction for three hours this morning, we came to a river running southeast. It was timbered well on each side with large spruce, poplar and some scattered balsam. This stream is 40 feet wide and about 8 feet deep, and the banks are 9 feet high and very steep. There does not seem to be any current. The water is bad, has a bad smell, and turns black when boiled. We followed down the stream through abundance of spruce and poplar. Spruce is the prevailing timber and is quite large. Very cold day.

December 9.—We continued down the river through spruce and scattered large poplar. A big muskeg was on our left. Very cold day.

December 10.—We continued down the river to-day about four miles. Spruce was plentiful, with a few gaps from 100 to 500 feet wide of small poplar. The big muskeg was still on our left. Very cold.

December 11.—To-day we continued down the river. At 4 p.m. we passed out of the spruce. I measured six acres and found for spruce an average of 62 feet B.M. and 9,000,000 feet for lumber, and 3,000,000 feet for pulp. The poplar averages 66 feet with 3,000,000 feet for lumber and 2,000,000 feet for pulp. The snow was $2\frac{1}{2}$ feet deep on the ridges. Snowed to-day.

December 12.—We came north this morning for three miles through low land covered with willow brush. Continuing we came to a spruce ridge running north and followed the ridge till dark. The timber along this ridge is very plentiful. Cold day.

December 13.—We followed the spruce ridge all day. Very cold.

December 14.—At 3 p.m. we passed out of the spruce into an alder swamp a half mile in extent. Continuing we came to a big marsh containing a large quantity of good hay. There was a small lake at the south end. This spruce ridge is about eight miles long, and is on an average of half a mile wide. The average dimensions for spruce is 53 feet B.M. with 4,000,000 feet for lumber and 3,000,000 for pulp. The average dimensions for the poplar is 66 feet with 8,000,000 for lumber and 4,000,000 for pulp. Bright and cold.

December 15.—This morning we were in the spruce at the south end of the marsh. There is considerable spruce scattered all over this district. I have seen to-day about 1,000,000 feet for lumber, average dimensions, 55 feet B.M., and 1,500,000 feet suitable for pulp. Poplar will average 55 feet B.M. with 3,000,000 feet for lumber, and 4,000,000 for pulp. Very cold.

December 16.—We went west to-day. We were going through brush all forenoon and at noon came to a lake, on the south side of which there is considerable spruce. On the north side there is open muskeg with considerable brush. The spruce will average 52 feet and about 300,000 feet for lumber and 500,000 feet for pulp. This afternoon we went northeast and came to the marsh that we crossed yesterday morning. Very cold.

December 17.—After crossing the marsh we came to the river. The ice is very bad here. Still continuing northeast for two miles through some good spruce and poplar, we came to a big open muskeg covered with brush, after which we came to numerous small lakes with a good many small islands. These islands are wooded

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with small spruce of no value. Travelling farther north we reached the northeast corner of the muskeg at dark. Fine day.

December 18.—About half an hour after leaving the marsh we came into very thick brush for half a mile. Next we came to spruce and poplar, spruce being the prevailing timber. Following the ridge for another mile, the spruce became very scattered, and the poplar more plentiful. This afternoon poplar was the prevailing timber the spruce being very scattered. Bright and cold.

December 19.—We followed the ridge all day and the timber was principally all poplar with very few spruce. Snowed to-day.

December 20.—This morning we went in a northerly direction, and at 8 a.m. we came to some good large spruce. After travelling through it we found the area to be about two miles square. It contains six million feet for lumber, average dimension about sixty feet, also two million feet for pulp. Bright and cold.

December 21.—Going east this morning for half an hour, we came to open muskeg. This extends as far as I could see, and I presume that this is the open country that connects with The Pas lake. I think that this is about twenty miles east of the meridian, and about two miles south of Carrot river. Going west this afternoon we came at three p.m. to the ridge we left yesterday. We followed this ridge till dark through poplar with very few spruce. Bright and cold.

December 22.—To-day we followed the poplar ridge. There was a big open muskeg on our right. Spruce was very scarce. Very cold.

December 23.—To-day we still followed the ridge. The poplar was very large. Cloudy with west wind.

December 24.—This forenoon the ridge turned considerably to the south, following round the east end of the marsh. At 3 p.m. we passed out of the poplar, into spruce, and reached 'Bad Water' river at 4 p.m. This ridge is twelve or thirteen miles long, and is on an average three-quarters of a mile wide. The poplar will average about seventy feet in dimension, with twelve million feet for lumber and four million feet for pulp. The spruce will average about sixty feet in dimension with two million feet for lumber and one million feet for pulp. Bright and cold.

December 26.—This morning we crossed the river, and came west through low swampy land. We saw no timber to-day of any value. Mild to-day.

December 27.—We came west to-day for six hours, through low swampy land, with considerable scrub spruce. At 2 p.m. we came to scattered spruce, and remained in the scattered timber the rest of the day. Snow to-day.

December 28.—This forenoon we were still in the scattered spruce. This afternoon we remained in camp. Very stormy, with strong east wind.

December 29.—To-day I examined the scattered spruce and poplar. Snowed hard all day.

December 30.—We reached Pasquia river at 2 p.m., coming through scattered spruce and poplar. The snow was three and a-half feet deep, which made the travelling hard. Snowed all day.

December 31.—We were still in the timber to-day. The poplar was plentiful and the spruce very scattered. Snowed and was very cold.

January 1.—We moved two miles up the river to-day. The banks were wooded with brush and there was considerable hay. This afternoon we travelled north of the river. The country was the same as yesterday. Very cold day.

January 2.—We moved down to the rapids to-day. The poplar and spruce was more plentiful here. Extremely cold.

January 3, 4 and 5.—We examined the timber north and east of the rapids during the last three days. There was quite a quantity of spruce and the poplar was plentiful. We have been in scattered timber for the last ten days. Dimensions of spruce sixty feet, and six million feet for lumber, and one million feet for pulp. Dimensions

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of poplar fifty-five feet and ten million feet for lumber and five million feet for pulp. Last three days very cold.

January 6.—We moved six miles down the river to-day. The banks were well timbered with poplar. Very cold.

January 7.—We went north about three miles, through low swampy land. Very cold.

January 8.—We went in a southeasterly direction through some small poplar of no value, and got back to Pasquia river at dark. Very cold.

January 9.—We went down the river and reached ‘Seventymile’ at 5 p.m., where I expected to get some provisions, but found the place deserted. Snowed all day.

January 10.—We reached The Pas at 1 p.m. Very cold, with north wind.

January 11.—We left The Pas this morning, and reached the end of the steel at 8 p.m., thirty miles south of The Pas. Thermometer showed 48 below to-night.

January 12.—We left for Etoimami by train. Very cold.

January 13.—We reached Etoimami. Very cold.

January 14.—We remained at Etoimami waiting for the train.

January 15.—We left Etoimami and reached Winnipeg on the 18th. We left Winnipeg and reached Ottawa on January 21, 1907.

Estimated quantity of standing timber east of the second meridian and north of Pasquia river:—

Spruce suitable for lumber.....	32,800,000 ft.
“ “ pulp.....	16,200,000 ft.
	<hr/>
	49,000,000 ft. B. M.
	Dimension 53 ft.
Poplar suitable for lumber.....	36,000,000 ft.
“ “ pulp.....	19,000,000 ft.
	<hr/>
	55,000,000 ft. B. M.
	Dimension 62 ft.
Tamarack for lumber..	3,000,000 ft. B. M.

Total estimated quantity of standing timber north of Etoimami and west of the Hudson bay extension of the Canadian Northern railway to The Pas on Saskatchewan river:—

Spruce	217,700,000 ft. B. M.
Poplar	301,800,000 “
Tamarack.	24,775,000 “
Balsam	16,000,000 “
Jackpine	20,000,000 “
Birch	7,000,000 “
	<hr/>
	587,275,000 ft. B. M.

I have the honour to be, sir,
Your obedient servant,
P. G. STEWART.

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APPENDIX No. 43.

REPORT OF W. THIBAUDEAU, C.E.

EXPLORATION SURVEY OF THE COUNTRY LYING BETWEEN FORT CHURCHILL AND THE PAS

OTTAWA, May 10, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my exploration survey of the country lying between Fort Churchill on Hudson bay and The Pas on Saskatchewan river, undertaken in accordance with your instructions of July 26, 1906.

I left Ottawa on July 27, 1906, and arrived at Halifax on July 28, 1906. I sailed from Halifax to Hudson bay on August 1, 1906, and arrived at Fort Churchill on September 2, 1906.

I was informed by the Hudson bay people, that all the Indians had left the fort a week before, and also, being short of provisions, they could not supply me with provisions for any length of time, nor with any men or dog teams. I was therefore compelled to endure delay as to commencing any exploration from Churchill to The Pas until I could secure help, and outfit, necessary to the accomplishment of the trip. In the meantime I made a detailed exploration of Churchill and surroundings and of Churchill harbour. I left Churchill for The Pas on January 2nd, 1907, and arrived at The Pas February 16, 1907.

Fort Churchill Harbour.

This harbour can be kept open all the year by the employment of ice breakers. Last year, 1906, the harbour closed between December 5th and 10th. The conditions, January, 1907, were as follows: In the bay at Fort Churchill the ice was eleven inches thick. It extended for a third of a mile from the shore into the bay. Ice was much thinner in the bay than in the harbour. There was some floating ice about a quarter of a mile from the edge of the bay ice. This is sent in by a northerly wind; should the prevailing winds blow from any other direction, there would be no floating ice. Beyond this floating ice there was clear open water straight away into the bay and beyond. This was the general condition up to and including January 2, 1907. An ice breaker similar to either the *North* or *South*, now in use between Quebec and Lévis, would, by making two trips a week, keep the harbour open the year round.

The neap tide is twelve feet and the spring tide sixteen feet. The average current in the harbour, with the tide running out, is six knots. This current would materially assist in keeping the channel free from ice; after it was broken by the ice breaker the tide would carry it out.

The Churchill river freezes about one month before the harbour, with the result that there is no discharge of heavy ice into the harbour.

The water in the Churchill being shallow there is, consequently, only a light discharge of ice under any circumstances, and its effect on the harbour is not appreciable.

The entrance to the harbour is about 2,000 feet wide, with a minimum depth of water of ten fathoms. Vessels drawing thirty-six feet of water could enter the harbour and anchor within 200 yards of the west shore, to a point 3,500 feet south of

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Fort Prince of Wales. The bay outside the harbour also affords good anchorage; there is ample depth of water.

A vessel drawing twenty-four feet of water can come within 150 yards of the east side of the harbour, from its mouth to a point 150 yards south of Battery beacon. There is also good anchorage south of the point last alluded to (150 yards south of Battery beacon) for 2,000 feet in length by 800 feet in width for vessels drawing twenty-four feet of water. Opposite Battery beacon for a distance of 2,500 feet across the harbour there is a minimum depth of twenty-four feet of water.

From the harbour entrance following the east shore, the bottom consists of sand deposited by eddies, caused by the outrunning tide. From the harbour entrance to a point 150 yards south of Battery beacon and extending into the harbour about 300 yards in width, the bottom might easily be dredged.

Churchill.

Churchill consists of two peninsulas, one on the west being about ten miles by three miles wide at the southern end, and one on the east side about five miles by two miles wide at the southern end. The western peninsula on its western side has two ridges, each from 90 to 125 feet in height; the northern one extending $3\frac{1}{2}$ miles southerly from Fort Prince of Wales, and the southerly one commencing at a point $4\frac{1}{2}$ miles south of Fort Prince of Wales and extending southerly a distance of 11 miles.

These ridges consist of (felspathic-quartzite) sandstone of a green grey colour, well adapted for building purposes. Fort Prince of Wales is built of this stone, and its durability may be gauged by the fact that it has not suffered, although built in 1733.

On the southerly end of the northerly ridge there is a deposit of white quartzite, similar in formation to Marble island; this stone takes a fine finish and is well adapted for ornamental building purposes; an area of about ten acres is exposed. The northerly ridge forms a level plateau, sandy in places, the southerly end being rugged. The southerly ridge is rugged from its northern end until opposite Mosquito point.

From the point of the west peninsula to the Royal Northwest Mounted Police post the terrace is sand and gravel—the balance to Mosquito point is clay and rocky till. Broken limestone is found in large quantities within half a mile southerly of the police post.

From Fort Churchill, for two and one-half miles southerly, the flat averages about one mile in width, and contains fine grazing land.

Fort Prince of Wales.

Fort Prince of Wales is situated at the west side of the entrance of the harbour at Churchill. It occupies a position about twelve feet above high water mark. It is built of sandstone quarried in the vicinity. The fort was commenced in 1733 and was completed in 1747. Joseph Robson was the engineer. The length of each side is 312 feet, three of the sides being of dressed and dimension stone both inside and out. This could be utilized for building purposes. The walls are 34 feet thick and 16 feet high, and were mounted by 40 cannon.

This fort was captured and partially destroyed by the French Admiral La Perouse, in 1782.

Royal Northwest Mounted Police Post.

The Royal Northwest Mounted Police erected, in 1906, a post on the beach about 6,000 feet southerly from Fort Prince of Wales—the post consists of six nice lumber buildings.

Fort Churchill.

Fort Churchill was established in 1688 and rebuilt in 1721; it is situated on the beach on the west side of the Churchill river about five miles from its mouth, and is

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the headquarters of the Hudson's Bay company. It has a missionary Episcopal church; the company's stores, etc., comprise about fifteen buildings. Back of this beach, which is 100 to 200 yards in width, rise steep bare rounded hills to a height of 80 and 100 feet.

Eastern Peninsula.

Following the shore from the entrance to the harbour for 150 yards south of Battery beacon there is a rocky ridge from 30 to 45 feet in height of the same formation as the one described on the western peninsula; the stone is also well suited for building purposes. Thence, for two and one-half miles southerly, the ridge takes a bend inland. The flat in some places being three-quarters of a mile in width between the ridge and the shore line.

On the plateau formed by this ridge, between the Battery and Battery beacon, from the harbour to the bay, there are good building sites. About a mile south of Battery beacon the plateau is sandy and, extending from the river to the bay, a distance of 3,000 feet in length by 1,200 feet in width, is also good for building sites. The balance of the plateau is more or less rocky and broken.

About three miles southerly of Battery beacon, and two-thirds of a mile from the river, are three or four fresh water lakes at an elevation of 15 feet above high water. The bottoms of these lakes consist of limestone; they cover an area of about one square mile and would furnish a good water supply.

Between the lakes and the river a good site exists for large railway shops and yards. The flats are formed of clay and rocky till.

From high water mark to a point half a mile in the river the water is only two feet deep—this land is susceptible to reclamation. About two and one-quarter miles from Battery beacon, southerly on the Hudson bay shore, there is a large deposit of limestone of a cream colour. This covers an area of 1,200 to 1,500 feet and extends into the bay as far as low water mark, a distance of about half a mile. This is easy to quarry, and would make good building stone and lime for building purposes.

Although there is no merchantable timber in the vicinity of Churchill, there is abundance of fine building stone and limestone to be found everywhere, and there is also an ample supply of timber for fuel purposes for many years along both banks of the Churchill river and around Button bay.

In September, October and part of November, large shoals of white whales (I counted thirty-five in one shoal) could be seen going up river at every tide. Salmon trout and whitefish are taken in the river and harbour all the year, but are more abundant in the spring.

At Churchill potatoes, turnips and other vegetables have been successfully raised at the Hudson bay fort. For many years cattle and horses have been successfully kept and bred at the Hudson bay post. Excellent butter was also made. Splendid pasture and hay meadows are found on both sides of the river above the harbour for a known distance of thirty-five miles.

At the head of Button bay there is an area of 2,000 acres upon which good hay can be cut, which has been pronounced by Professor Macoun as affording excellent forage. Wild black and red currants and gooseberries are found in great quantities, and are the equal, if not the superior, in flavour of garden produce. Barrels of black currants can be picked around Fort Prince of Wales; cranberries exist in great abundance everywhere. Other berries which are indigenous to the climate abound.

Game and Fur-bearing Animals.

Within a few miles of Fort Churchill, in the fall and winter, large herds of barren land caribou were encountered. These herds supply fresh meat of an excellent quality for the residents of Churchill. Polar bears are occasionally shot in the vicinity. Along the western peninsula Eskimo congregate in the spring for the purpose of seal hunting. The animals frequent these shores in the spring in large numbers.

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Among the fur-bearing animals are found black fox, silver fox, red and white fox, marten and wolves, both black and grey.

Swans, geese, ptarmigan and many species of duck in large numbers, and some spruce grouse are found along the shores of Churchill harbour and river.

Exploration between Churchill and North River.

Between October 24, 1906, and November 9, 1906, I made an exploration of the country between North river and Churchill river for a distance south of Button bay, of about twenty miles. On the east side of Button bay I found a strip of good timber, consisting of spruce and tamarack, six to ten inches in diameter, about half a mile wide and extending three to four miles in length on the east side, between the southern ridge of Churchill peninsula and the bay, and about three miles southerly from Fort Churchill.

At the head of Button bay (and parallel with it) there are a number of parallel ridges extending to North river. These ridges are timbered with spruce and tamarack four to ten inches in diameter. Close to North river there is good spruce timber ten to thirty inches in diameter in small scattered bunches, covering a distance of about four miles.

At the southern end of the south ridge of the western peninsula at Churchill, there is a strip of good spruce timber six to twelve inches in diameter extending about two miles by four miles; also on the east side of the same ridge about one and one-third miles south of Mosquito point, there is a strip of good timber for a distance of about four miles. The balance of the country explored was level and perpetually frozen and open, covered with thick moss and small ponds, with bluffs of scrubby timber occasionally.

Exploration to Owl River.

Between December 7, 1906, and December 17, 1906, I made an exploration of the country between Churchill and Owl river. Four miles from Churchill river in a southerly direction, I crossed a ridge, running in a northeast and southwest direction at about one and one-half miles from Hudson bay, extending opposite to Mosquito point. From the point of crossing to the bay, on the sunny side the ridge is well timbered with spruce six to twelve inches in diameter. Twenty-five miles from the starting point, I crossed another gravel ridge with scrubby timber. Two miles west of this point there is a barren hill known as White mountain, three hundred feet in height by one mile in length. At the eastern woods there are a few square miles of spruce and tamarack averaging six to eight inches in diameter. Close to White Whale lake I crossed another gravel ridge on which there is no timber. On each side of Salmon creek there are scrubs, willows and small spruce, with grassy meadows. At Broad river to the left of the place of crossing, for about four miles there is a strip of timber one-third of a mile in width, eight to fourteen inches in diameter, black spruce, stunted.

The balance of the country is open, level, plain perpetually frozen, covered with thick moss and having many ponds. For one whole day we passed through an immense herd of barren land caribou. There must have been thousands of them.

General description of the country along the route travelled from Fort Churchill to

The Pas.

From station 0, Churchill harbour, the first four miles are through open country, the soil is clay and rocky till, about eight feet above high water. To the east of the proposed route, about three-quarters of a mile from high water mark, there is a sandstone ridge about forty feet high, extending towards Hudson bay for a distance of seven miles.

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From station 4, the country is covered with scrub timber and tamarack for a distance of twenty-eight miles. Small shore ridges averaging six feet in height, are also found along this section. Those ridges are frozen and covered with moss.

At station 52, Deer river was crossed; at that point it is three hundred and fifty feet wide from bank to bank, and the banks are twenty-five feet high.

From station 32 to station 100, the country is a level, open plain. Some timber is seen along Deer and Churchill rivers.

At the end of September, I dug two holes, one on each side of Deer river, twelve miles from its mouth, and at seven feet deep found clay with rocky till; the material gone through was peat, containing about 50% of ice, heavily covered with moss. On this last section there are a few shallow ponds which can be easily avoided. Timber is seen along Churchill and Deer rivers.

From station 100 to station 130, Churchill river, the country is covered with scrub spruce and tamarack from four to six inches in diameter. There are also a few lakes and swamps, and some ridges from ten to fifteen feet high. This last section is about two hundred and fifty feet above Little Churchill river. From station 130 we reached Churchill river about three miles below the mouth of Little Churchill. There is no timber along this part. From that point we travelled on the east side of Little Churchill river to station 200. Along this section there is some timber from six to fourteen inches in diameter. The country is dry, more or less rolling, with a depression of ten to fifteen feet. At a distance from station 200 a ridge is seen in a southwest direction.

At station 200 we crossed again Little Churchill river, thence followed its west side to Washkaiowaka lake. That section is fairly level and dry, with some scrub timber. Washkaiowaka lake is about sixteen miles long, it has two extensions connected by narrows; clayey hills, thirty to forty feet above the lake, were seen on the northern shore of the northern part of this lake. The banks are steep and covered with very thick mossy peat, probably ten feet thick. The timber consists of black spruce and white birch from five to sixteen inches in diameter. At station 240 we crossed the same ridge seen at station 195. This ridge is 200 feet high, and runs a few degrees south of west. It is thickly timbered with spruce four to ten inches in diameter. From station 240 to station 250 on Split lake, Hudson's Bay post, the country is generally low and swampy. Travelling over three lakes, we found their shores well wooded with spruce, tamarack and birch. From Hudson's Bay Company's post to the mouth of Grass river, station 280, the country on the east side of the lake is undulating; part of the banks and islands are fairly timbered with spruce.

From the mouth of Grass river to station 294, on the east side of the river, there is no timber of commercial value. The country is more or less swampy.

From station 294 to station 310 we reached Burntwood river, which is about 450 feet wide at that point. The banks are about twenty feet high, showing granite in some places on either side. The country is hilly, with swamps and scrub timber.

From station 310 to station 355, on Grass river, the country travelled through is very much like the last described section. •

From station 335 to station 364, Landing lake, the country travelled through is covered with scrub timber, with the exception of a few bunches of good timber here and there. Part of the shore of Landing lake and the islands are well timbered with spruce six to ten inches in diameter. Travelling from Landing lake to the head of Sipiwesk lake, the country was found dry and well timbered with spruce from eight to fourteen inches in diameter. About half way on this section we crossed a ridge about eighty feet high, on which we noticed Mr. Bayne's old exploration line. From station 364 to station 400 the islands of Sipiwesk lake are well timbered with spruce, some being thirty inches in diameter.

From station 400 to station 412, Nelson river, the country travelled through is hilly, dry and covered with scrub timber.

From station 412, H. B. post, on Cross lake, there was no timber of commercial value seen on the islands.

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From station 422 to 436, Duck lake, the islands or portages were covered with scattered spruce trees.

From station 436 to station 460, Setting lake, the country is level and dry, covered with spruce four to six inches in diameter, and some ridges fifteen to twenty feet high, running parallel in a northeast and southwest direction. At station 438 we crossed Mr. Bayne's old exploration line.

From station 460 to station 480 we followed the west shore of lakes, and Grass river. The country is good, dry and undulating.

From station 480 to station 500 the country is dry and level, covered with scrub timber. From station 500 to 520 we struck Grass river. The country on this section is rough, and is covered with hills and ridges, some 150 feet high, running in a northeast and southwest direction. No timber of any commercial value was seen around.

From station 520 to station 558 we followed Grass river, Wekusko lake and Reed lake. The country travelled is rough and hilly.

On Reed lake the islands are well timbered with spruce six to fourteen inches in diameter.

From Reed lake to station 616 the country is level, 40 per cent being swampy. There is some spruce and tamarack timber four to eight inches in diameter.

From station 616, on the north side of Cormorant lake, there is a strip of timber, four miles wide by ten miles long. This timber is the best seen while exploring around that country.

From Cormorant lake to The Pas the country is undulating, without any timber of commercial value.

The total mileage of the route explored is 690 miles.

From the above exploration I made of the country, a good railway can be built at reasonable cost almost anywhere close by my proposed location. What is absolutely necessary is good drainage, the country having so little slope, the closer one follows the rivers the cheaper the drainage of the line will be.

The proposed route shown on the accompanying map seems to me the best location for a railway in that part of the country.

A railway from The Pas on the Saskatchewan to Churchill on Hudson bay, would be of the greatest commercial advantage for the people of the west and northwest for the following reasons:

The average saving in rail transportation, for Manitoba, Saskatchewan and Alberta, via Churchill, as against Montreal to Liverpool would be 970 miles.

The distance from Churchill to Liverpool is 2,940 miles. From Montreal via Belle Isle, 2,761 miles. From Montreal via Cape Race, 2,927 miles, from New York 3,079 miles.

The freight upon grain from the wheat belt to Hudson bay would approximate ten cents a bushel, the same as to Port Arthur—the additional fifteen cents from there to the Atlantic seaboard would be saved to the farmer, and this of itself represents a fair profit to the wheat grower. Assuming an export trade of 20,000,000 of bushels, which can easily be handled in two months of the season by the proposed railway, the saving of fifteen cents a bushel being the difference in cost of freight from Port Arthur to the Atlantic seaboard would amount to \$3,000,000.

A very important feature in connection with a railway which secures quick access to the sea, is with relation to the shipping of cattle to the European markets; this great industry is at present seriously handicapped in consequence of the long journey to be endured under present conditions. It is admitted as a well recognized fact, that cattle shipped to the Atlantic coast arrive at the shipping port in poor condition, emaciated by long days of rail travel. It is also admitted that on the sea journey they gain rather than lose in flesh, if put on board in good condition. Experience proves that after three days of rail travel cattle will deteriorate; that three days is about the limit of the time during which they can travel and maintain the condition in which they are placed on board. This being so, cattle could be transported to Fort Churchill

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without loss in flesh, and the voyage to Liverpool would improve this condition rather than the country. Therefore this great industry alone would find in the Fort Churchill route a solution of the difficulty under which those engaged in the business of cattle shipping now labour.

Mr. F. W. Peters, assistant freight traffic manager of the Canadian Pacific at Winnipeg, states that up to the end of October over 72,000 head of cattle had been shipped to Liverpool from western Canada, and he expected a further 10,000 head to be shipped that season. The freight rate on these cattle would be about sixty cents a hundred pounds in car lots from Winnipeg to Montreal. The rate from Calgary to Fort Churchill would be about the same as to Winnipeg, and the distance about equal, so that this sixty cents a hundred pounds could be saved to the shipper if he could put the cattle on board at Hudson bay, and he would also prevent the shrinkage which would otherwise occur, by reason of the additional rail journey from Winnipeg to Montreal.

Upon the 82,000 head of cattle shipped to Montreal from the west during the past season, the saving in freight alone would be \$6 a head, or, in round figures, \$650,000, equal to about 20% of the selling price.

Pulp Wood.

All the timber between the head of Little Churchill river and Churchill is reserved for fuel purposes. The pulp wood belt as estimated below begins at Split lake and extends to The Pas, ten miles in width on each side of the way proposed for the route of the Hudson Bay railway. On this area, assuming one-sixth to be covered by pulp wood, the balance being river, lakes, ponds, swamps, etc., and assuming ten cords per acre of an average of six inches in diameter, there would be 5,756,660 cords. This is a very low, but safe estimate.

Water Powers.

Deer river, at its mouth, has a minimum flow of 70,000 cubic feet per minute. A dam eighteen feet high can be built at reasonable cost and would generate 1,600 horse power. Two dams of the same height could be built within ten miles of the river mouth, which is twenty-five miles from Churchill.

North river, which is three hundred and fifty feet wide during December, had a flow of not less than 250,000 cubic feet per minute. This could be dammed for fifteen feet high and would generate about 5,000 horse power.

On Churchill river, within sixty and eighty miles from Churchill, large water power could be developed and transmitted to Churchill.

Nelson river, Burntwood river and Grass river, have a number of falls which could be utilized for the development of power for use in pulp mills or other industries.

Coal and Minerals.

Notwithstanding that a most searching examination was made I failed to find any coal cropping or indications.

As to minerals, the best specimens of rock which I found at Churchill and surroundings, were assayed at the Geological Department, and contained only magnetic iron; no traces of precious metals were found. In the surroundings of Wekusko lake are many exposures of rock of Huronian formation, and this being mineral formation, should precious metals exist, the country would be an easy one in which to prospect.

Game and Fish.

From timber line on Hudson bay to The Pas are found moose and caribou in fair quantities. Rabbits are scarce throughout the country explored. We saw a

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few spruce grouse; ptarmigan are found plentifully, but not farther south than Grass river.

Fish.

Whitefish abound in all the lakes from Churchill to The Pas; also in some lakes are found trout, pike and sucker. Indians and travellers rely upon this source of supply for dog feed.

Swamps and Marsh.

About 35 per cent of the country travelled through is marshy and swampy; more or less hay is grown. Under marshes or swamps the soil is generally clay.

Farming Land.

I have no doubt that when the swamps and marshes are drained and moss stripped they will be susceptible to farming operations between Churchill and The Pas, and at a later period, after the Northwest is settled, this land will become valuable.

From September to January at Churchill.

September was very windy, rather cold and a few days of rain; October splendid weather, bright and clear; November some snow and rather windy; December colder and more snow. The coldest day was 38 degrees below zero. The accompanying schedule shows temperature.

I have the honour to be, sir,
Your obedient servant,

W. THIBAudeau, C.E.

1907.		Place.	Aneroid at 7 p.m.	Tempera- ture at 7 p.m.	Wind.	THERMOMETER.		Remarks.
Month.	Day.					Minimum.	Maximum.	
January	1	Fort Churchill.						
"	2	R. N. W. M. P. Post	30.67		S.	0.00		Barometer at R. N. W. M. P. post at 10 a.m. B=30.67, at 10 a.m. depth of snow 16 inches.
"	3	Mosquito Point	29.76					1 mile above Mosquito Point, tide water.
"	3	"	758 m.m.	5.00	S. E.	5.00		
"	3	"	29.76					
"	4	"	29.70					
"	4	"	757 m.m.	10.00	N. W.	5.00		
"	4	"	29.75					
"	5	Churchill River	30.09					
"	5	"	763 m.m.	-20.00	Calm.	20.00		On the middle of river amongst a bunch of islands opposite mouth of Deer River.
"	5	"	30.26					
"	5	"	30.14					
"	6	"	765 m.m.	1.00	S. W.	0.00		" " some snow.
"	6	On small creek	30.35					10 feet above Deer River.
"	7	"	30.33	2.00	W.	0.00		3 miles from its mouth.
"	7	"	768					
"	8	Deer River	30.07					30 ft. above Deer River and about 30 miles from its mouth.
"	8	"	762 m.m.	2.00	S. W.	-3.00		About 35 ft. above Deer River and 55 miles from its mouth.
"	9	"	29.18					
"	9	"	29.19	2.00	Calm.	-8.00		
"	9	"	742 m.m.					
"	10	Head of Deer River.	29.06					Snow 16 to 20 inches deep, head of Deer River.
"	10	"	737 m.m.	7.00	Calm.	8.00		
"	10	"	29.02					3 miles below mouth of Little Churchill River and 124 ft. above river.
"	11	Churchill River	29.44					
"	11	"	746 m.m.	-1.00	N. W.	-2.00		Snow 16 to 18 inches deep.
"	12	Little Churchill River	29.72					25 miles up Little Churchill River.
"	12	"	754 m.m.	-7.00	S. W.	-10.00		10 ft. above river.
"	13	"	29.82	-10.00	W.	-14.00		At Putnon Indian camp.
"	14	"	29.95	-10.00		-18.00		" " Banks 16 ft. high.
"	15	Waskatowaka Lake	29.72					
"	15	"	29.75	0.00	Calm.	-6.00		
"	15	"	751 m.m.					
"	16	Towards Split Lake	29.64					Snow 20 inches deep.
"	16	"	29.67	-10.00	S. W.	10.00		
"	16	"	750 m.m.					
"	17	15 miles from Split Lake.	29.36					
"	17	Split Lake	29.36	-2.00	S. W.	-5.00		At Indian fishing camp.
"	17	"	744 m.m.					

1907.		Place.	Aneroid at 7 p.m.	Tempera- ture at 7 p.m.	Wind.	THERMOMETER.		Remarks.
Month.	Day.					Minimum.	Maxim'm.	
January	18	Split Lake.	29.46	-25.00	S.W.	-10.00		Snow 24 to 26 inches deep, 14 feet above lake.
"	18	"	747 m.m.					
"	19	"	29.60	-28.00	S.	-39.00		
"	19	"	751 m.m.					
"	19	"	29.66	-32.00	Calm.	-48.00		" " "
"	20	"						
"	21	Churchill River.	29.98	-28.00	S.	-42.00		1st rapid, 30 ft. above 1st rapid.
"	21	"	749 m.m.					
"	22	Grass River.	29.96	-28.00	S.W.	-38.00		8 ft. above Grass River and 15 miles from its mouth.
"	22	"	761 m.m.					About 35 ft. above river.
"	22	"	30.12					
"	23	Natawanan.	29.55	-28.00	S.	-42.00		
"	23	Grass River.	749 m.m.					
"	24	"	29.75	-4.00	Calm.	-9.00		" "
"	24	"	753 m.m.					
"	24	"	29.85					
"	25	"	29.47	-14.00	S.	-28.00		
"	25	"	748 m.m.					
"	25	"	29.55					
"	26	"	29.51					
"	26	"	747 m.m.	-14.00	S.	-18.00		Compon, a portage about 20 ft. above river.
"	26	"	29.52					
"	27	Nelson River.	29.65	-35.00	S.W.	-38.00		Snow 3 ft. deep.
"	27	"	747 m.m.					Head of Nelson and Sipiwesk lakes.
"	27	"	29.72					8 ft. above.
"	28	"	29.69	-34.00	S.W.	-42.00		On an island, snow 3½ ft. deep, 7 ft. above Sipiwesk Lake
"	28	"	748 m.m.					
"	28	"	29.80					
"	29	Sipiwesk Lake	29.72	-34.00	S.W.	-38.00		Portage between Sipiwesk Lake and Grass Lake.
"	29	"	29.75					
"	29	"	752 m.m.					
"	30	Cross Lake	29.55	-34.00	S.W.	-38.00		Hudson's Bay company's post, 14 ft. above lake.
"	30	"	756 m.m.					
"	30	"	29.56					
"	31	"	29.46	-28.00	S.W.	-40.00		" "
"	31	"	747 m.m.					" "
"	31	"	29.43					" "
"	31	"	29.68	-20.00	S.W.	-24.00		14 ft. above lake.
February	1	"	754 m.m.					"
"	1	"	29.80					"
"	1	"						McLeod's place.

[illegible]

APPENDIX No. 44.

REPORT OF J. N. WALLACE, D.L.S.

SURVEY OF BLOCK OUTLINES IN NORTHERN SASKATCHEWAN.

CALGARY, ALBERTA, May 11, 1907.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on the survey of the fourteenth base line, from the third to the second meridian and of part of the second meridian, undertaken in accordance with your instructions of May 1, 1906:—

I left Calgary on May 8, and after a few days spent at Edmonton, where I purchased the pack outfit and some of the horses, I left for Prince Albert and reached there on May 14. Here, owing to very rainy weather and the difficulty of getting the required number of pack horses, I was delayed for over a week.

Pack horses are hardly known as a means for transportation at Prince Albert, and it was a difficult matter, therefore, to get the right class of horses. Several of the horses I was compelled to take were too big, and caused serious delay subsequently on account of their inability to carry a pack load across swampy ground.

We left Prince Albert on May 21 and reached the northeast corner of township 52, on the third meridian, where I was to commence work, on the evening of the next day. From this date until June 1 the time was occupied in retracing that part of the fourteenth base line already run, a distance of twelve and three-quarter miles across the fractional range 28 and ranges 27 and 26.

The base line was continued as an original line easterly from the east side of range 26, and good progress was made up till September 7, when we reached Saskatchewan river at the east side of range 13, having completed ninety-one miles of line in a total of ninety-two days, excluding Sundays only.

The greater part of the district through which the line had already been run lay between the third meridian and the middle of range 23, where the road to Candle lake crosses the line. There is a great deal of first-class land in this area. Between Candle lake road and Saskatchewan river the line passes through a very mixed country. There are many good areas and many very large swamps. The soil is very sandy near the crossing of Torch river.

The Hudson's Bay company had sent a scow down Saskatchewan river in August with supplies and oats from Prince Albert and cached them on Birch island, the cache fortunately coming within a hundred yards of the line. These supplies were supposed to be sufficient to take me to Pas mountain.

Subsequent to the reaching of the river the work was seriously delayed by many causes, so much so that the average rate of progress of the last half of the work was only about half the rate of the former half.

After leaving Saskatchewan river the base line passes through a lightly timbered country for a few miles, when it meets the first of those muskegs which were to prove so disastrous to transportation during the following two months. This first muskeg begins two miles east of the township corner, between ranges 12 and 11, and extends about two miles and a-half along this range. After a vain endeavour to get round it, and finding the country north and south to be worse the farther from the line we went, we finally decided to take the horses right across the bog land, which was accomplished after much trouble.

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For about six miles after this, in the neighbourhood of Petaigan river, the country is much better. Although it is thickly timbered and there are local swamps, there are some large areas of first-class land. At the end of this six miles and about four miles east of the township corner, between ranges 12 and 10, we came upon an area of muskeg, swamp and slough land, which extends continuously along the line to the crossing of Carrot river, in range 4, a total distance of twenty-nine miles.

From September 25, when we met the first of the wet lands, until November 15, when the ground became frozen hard, transportation was one continuous struggle. Open bog land or swamps, with scattered stunted tamarack and spruce, stretched for miles in all directions, and in many instances the only way to get the horses across was by constructing a causeway made of small spruce trees. For this purpose trees fifteen to twenty feet high were cut down and laid lengthwise in bundles on the surface of the bogs in a regular manner, so that the stems of each bundle were covered by the brush tops of the succeeding one. In this way we constructed an aggregate of several miles of roadway, cutting down thousands of trees for the purpose, and working day after day in water from six inches to a foot in depth.

The previous June a large amount of supplies had been sent out for me by the Hudson's Bay company at Prince Albert to their post at Pas mountain. These went down Saskatchewan river and Sipanok channel and then up Carrot river. The position of this post was shown on all maps to be at the middle of range 4.

As time went on and the supplies in camp became lower, and the general aspect of the country showed no signs of improvement, I became anxious to get in touch with Pas mountain. I was in the unfortunate position of having all the oats back at Birch island and the supply depot ahead at Pas mountain. If I persisted in going on the horses, which were daily getting weaker for want of feed, would finally play out altogether, and if I went back to where the oats were and waited for the muskegs to freeze over before continuing the line, I would have run out of supplies long before I could have got the line up to range 4, where I believed the H. B. post was. Moreover, I would have had no hay for the horses.

We had already sent back for some of the oats, but the absence of the horses on a trip back over the swamp land was so prolonged that the work was seriously handicapped by our inability to move camp, and great delay was caused thereby.

The chief trouble lay in the fact that there was no one in the party who had the least idea where Pas mountain was. The general appearance of the country was such as to inspire little hope that any one would be able to travel the necessary twenty-three miles ahead and find where the post was, and it seemed still less likely that they would be able to get any supplies back even if the post were found.

While in this dilemma it was a relief on November 12, to meet with a chance Indian hunter, the first stranger we had seen for eight weeks, and to learn from him that Pas mountain was only six miles away. Such indeed proved to be the case, the post being shown on the maps seventeen miles too far east.

Meanwhile the line had been slowly advancing and was now at the east end of range 8, about two days out of three being occupied in fixing pack trails and moving camp. Five of the horses had already died and the remainder were rapidly failing. The supplies and oats I had ordered from Fort a la Corne could not arrive until the middle or end of December, when the muskegs would be frozen over. There was no recourse, therefore, but to send the horses back to Birch island.

While the slough land was sufficiently frozen to carry horses on November 18, the tamarack bogs were not, until December 1.

On November 27, the base line was surveyed up to the middle of range 6, and a tie line of over three miles had been run to Indian reserve No. 29a. I then moved camp six miles ahead of the work and despatched the horses back to Birch island on a round trip of one hundred miles, sufficient hay for at least part of the journey having to be packed on the horses in sacks. The men returned to camp on December 11, after a severe journey, the temperature now being frequently as low as forty

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degrees below zero. They could bring back only enough oats to last three weeks, but the horses had been well fed since December 4, the date on which they reached the oats at Birch island, which was the important thing.

On December 20, three teams from Fort a la Corne reached Pas mountain with oats and supplies. They had a hard journey, having no regular road and having had to break trail in the deep snow for nearly the whole of the hundred miles from La Corne.

The freighters brought out your letter of December 5 in reference to the necessity of completing the work, and I considered it well to engage one of them to come back from La Corne with some more oats about the end of January, and to then help us with the transportation till we ended the work. This arrangement had a material effect in enabling me to complete the survey.

On December 21, after nearly forty miles of muskeg and slough land, we reached the crossing at Carrot river in the middle of range 4, which was the end of the wet lands.

Nothing in the way of settlement can take place along ranges 7, 6, 5 and 4 until drainage on a very large scale is carried out. Both Carrot river and Sipanok channel should afford a good basis for such a system when the progress of settlement is such as to justify large expenditures in the less favoured areas. These lands, it should be remembered, are not bogs or muskegs like the lands in ranges 8, 9, 10 and 11, but consist of flooded slough land with long reeds and grass.

With regard to the muskegs it has been stated that railway engineers, in sounding along the new line from Etoimami to The Pas, found the average depth of bog to be only four feet with a substratum of hardpan, and the greatest depth found was nine feet. The explanation of the bog would then be that the water could not drain downwards, and in these northern latitudes did not evaporate, and in the course of ages the depressions silted up. There may be some ground for the idea, that the order in course of time is bog land, tamarack swamp and then spruce swamp, the lands gradually silting up and vegetation growing at an increasing rate as the land becomes drier. I think, however, that many bogs are much deeper than nine feet.

East of the crossing of Carrot river the country is thickly timbered. At the east end of range 4, the foot of Pasquia hills was reached. The ascent up these hills continued over an exceedingly rough, broken country, composed of ravines, cutbanks, and hills, covered with timber. The snow got deeper and the work more fatiguing every day until, on January 29 we at last reached the summit at the middle of range 2, with the snow at least three feet deep and the temperature anything from thirty to forty-five degrees below zero.

The highest point reached on the line is fourteen hundred feet above Carrot river, but the hills farther south reach some two hundred feet higher.

We had been through some hard work in the muskegs between Saskatchewan river and Pas mountain, but the experience of getting the line over these hills, or rather mountains, put all else in the shade. Not only had we the deep snow and rough country, but being on the northerly slope of the mountains we were exposed to the bitter winds coming in over the vast open areas to the north. We received, moreover, little benefit from the sun, as it seldom rose, so far as the valleys are concerned, until ten o'clock and set about half-past one or two.

From the centre of range 2, the hills descend rapidly to the east, their foot being about two miles west of the second meridian.

On February 19 we closed on the second meridian. The total deficiency in one hundred and sixty-three miles was four chains and two links (265 feet) in distance, and the line struck two chains and forty links (160 feet) south of the iron post planted in 1901, which was the theoretic end of the base line.

From the summit of Pasquia hills, on the base line, an extensive view is obtained. Theoretically the horizon is some forty-five miles distant. To the northeast the country is apparently as level as the sea. By far the greater proportion appears to

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be composed of open slough land, bog land or lakes. For a few miles east and west of the second meridian the greater part is covered by bush of some kind, but looking to the northeast and northwest only a small fraction of the area is other than land more or less flooded.

Surveying in that area in winter will always be a severe operation on account of the deep snow and intense cold, but it would appear to be an impossibility to survey it at any other season. I may say that the satisfactory marking of the corners in such an area is a most difficult question to decide.

On February 22 we moved camp northeasterly nine miles to the north of township 53 on the second meridian from which point I was to continue on this meridian. The freighter whom I had engaged to come out from Fort a la Corne at the beginning of the month had, during the previous two weeks, been hauling hay, oats and supplies some thirty-five miles from Shoal lake to this point.

On the same date I opened up the last mile of the second meridian previously surveyed, and had the far too common experience of finding that the iron post, which should have been at the township corner, was not there. I therefore retraced the last two miles and planted a new iron post at the north of township 53.

The meridian was run north for sixteen and a half miles when we came to Saskatchewan river, where I had been instructed to end. On the southerly bank I planted a temporary iron post marked 'II Mer.' It is twenty-nine chains north of the southeast corner of section 25, township 56. An approximate connection was made with the traverse of the river made by Mr. Klotz, D.T.S., in 1884, and on the evening of March 12, a pretty well tired out survey party made their way back to camp, through the deep snow, for the last time.

Next day we commenced the homeward journey of two hundred miles to Prince Albert travelling back along the meridian to Carrot river and up this river and Sipanok channel and so to Shoal lake and then to Red Earth (Pas mountain).

From Red Earth, we had a journey across country of nearly one hundred miles to Fort a la Corne, which place we reached on March 22, and finally reached Prince Albert on March 25, after an absence of ten months. The party were paid off the same day, and I reached Calgary myself on March 30.

In all, one hundred and eighty-three miles were surveyed of which a total of fourteen and a half were retracement.

The lands along the base line and meridian are described in detail in attached separate report.

As regards the summer climate I should consider it very good for agriculture. There is abundance of rain. The only summer frost occurred on the nights of August 22, 25 and 30 when ice as thin as paper was formed. The minimum temperature was 28° . The first snow to remain, fell on November 2. The first frost of any consequence occurred about November 15. On November 29 the temperature dropped suddenly to 5° below zero and on December 7 to 41° below. During December, January and the first of February the cold was steady and intense, not abating, even for a day. It was considered an exceptionally severe winter all over the Northwest, but it is always severe near Cumberland House and The Pas.

The hottest day of the season was August 13, with a temperature of 92° in the shade.

As the matter of transportation is becoming every year a greater strain on the resources of the survey, a few general remarks on the comparative value of horses and dogs in winter transportation may not be out of place.

A team of dogs consists of four as a rule, harnessed one in front of the other, but in the country near The Pas the team consists of five, as the dogs of that country are small. A dog's ration is two or three fish given to him once a day, in the evening. Each fish weighs about two and a half pounds on the average, so that each dog consumes about seven pounds of fish a day. For a team of five dogs this amounts to thirty-five pounds. The team will draw as much as four hundred pounds.

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On the other hand ponies can be kept on ten pounds of oats and twenty-five pounds of hay. Last winter I fed the ponies only seven pounds of oats daily and about twenty-five pounds of hay per head, and they came through in good condition. The only protection they had was a double pack blanket sewn under a heavy canvas pack cover. They never had a tent, rather because I hadn't one, than because I did not think it worth carrying. Each pony carried up to five hundred and fifty pounds. We used flat sleighs, fourteen feet long and twenty-four inches wide, although a width of only twenty or twenty-two inches is better.

We have then the general conclusion that a dog team will haul four hundred pounds with a daily consumption of thirty-five pounds of feed, and that a pony will haul five hundred and fifty pounds when supplied with practically the same weight of feed. Unless, therefore, the greater distance-covering power of the dog team can be utilized, its advantage over a pony is not apparent.

When working in a bush country, a survey camp can seldom be moved more than six miles at a time, and not more than twice a week. For such short heavy hauls with bulky freight, such as tents, rolls of blankets, cook outfit, etc., unsuited to a light dog sleigh, the pony is certainly ahead of the dog team; while for bringing in compact heavy freight, such as supplies or oats to camp from a far-off base, a dog team is more satisfactory. Moreover, the dog's power to cover a much greater distance than a pony, enables a surveyor to keep the dogs at the base of supplies and have them only visit his camp periodically with supplies. He is therefore relieved of the necessity of having to haul fish for the dogs' use while in camp between trips.

The disadvantage of the pony, as compared with the dog team, is his slower pace and the bulk of his hay. Of course, there are often other considerations which in a practical instance would be the determining factor in deciding which of the two means to use. In some regions fish are plentiful and hay impossible to obtain. In others the reverse is the case. Fish are not so easily obtained as is generally supposed.

If a surveyor is notified in time that he is to work during the winter in a certain district, he can frequently arrange to have hay put up for him during the previous summer not very far from his district. This will, of course, generally be slough hay, and many ponies have to be first trained to eat this. The greatest distance I had to haul hay last winter to camp was fifty miles.

An experienced man can pack four hundred pounds of hay, or even more, on a flat sleigh. In loading hay the side ropes are laid out on the ground and a wagon cover laid down on top of the sleigh. The hay is carefully loaded on, keeping it in long rolls as it is drawn from the stack. The canvas is then turned up over the sides and the whole is roped down until almost as hard as baled hay. A pony can thus haul enough hay to last himself at least sixteen days. This was the actual rate at which hay was supplied to the ponies last winter. I may say a very great deal depends on the man who has charge of the ponies. It is almost impossible to get some men to serve exact rations of hay and oats.

There cannot be very much difference in the daily cost of feeding dogs or ponies. The fish necessary for a dog team will cost about fifty cents a day delivered within a few miles of where they are caught. In the regions where base lines are now being run oats will cost about one dollar and a-half a bushel delivered, and hay should not run over a cent a pound at the outside if put up in the district. This would make the total cost of the pony's feed about seventy-five cents a day. As he carries nearly half as much again as the dog team, the cost works out practically the same. For exploration work, or for bringing supplies or oats periodically to camp, a dog team is ahead of a pony. In general, a long, quick journey with a compact load, especially if the snow is deep and the country open, is the ideal condition for using a dog team. For slow, heavy freighting in the bush, such as occurs in working along a base line, a pony will generally be best, even if oats are expensive and hay bulky. I believe the combination of the two methods indicated above will often be found to work out satisfactorily.

I wish to record the manner in which Mr. F. W. Rice, my assistant, stood the many trying days of the winter. He had perhaps the hardest task in the outfit in

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managing the transit work, and that we were able to complete the survey was due in a large measure to his power of endurance.

I have the honour to be, sir,
Your obedient servant,

J. N. WALLACE, *D.L.S.*

APPENDIX No. 45.

REPORT OF ARTHUR O. WHEELER, *D.L.S.*

PHOTO-TOPOGRAPHICAL SURVEY OF THE ROCKY MOUNTAINS.

CALGARY, Alberta, November 26, 1906.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—The party left Calgary for the field of operations on June 10. With one assistant, the writer stopped at Banff to take some views from Sulphur mountain, for the purpose of ascertaining the speed of the plates to be used during the survey; and then returned to Calgary to develop these test plates. The remainder of the party gathered at Laggan, to which point the pack horses and survey outfit had been sent two days before.

Ptarmigan Lake Country.

A short distance northeast from Laggan, on the Canadian Pacific railway, lie some beautiful alpine valleys dotted with small lakes and enclosed by strikingly bold snow-clad peaks. This region, situated chiefly in townships 29 and 30, range 15, west of the fifth meridian, has begun to attract the attention of the tourist; so much so, that in 1905 the railway company put in a well-graded pony trail to accommodate visitors to the mountains staying at Lake Louise chalet. As previous surveys had not embraced this particular locality, a camp was taken near the summit of the watershed between Bow and Red Deer rivers, and later a second camp was established on the headwaters of Red Deer river. In all, ten peaks were climbed in the vicinity and twenty camera stations occupied furnishing full information for mapping. Work here was closed on July 4.

At this high altitude, the spring had barely set in and snow was still lying plentifully on the passes and the lakes were clad with ice. It snowed every other day, thereby much retarding the work. The lake near the summit of the pass from the Bow valley, forming one of the extreme sources of Red Deer river, is locally called Ptarmigan lake. It is well named, for round its shores, in all the adjacent valleys and on the alpine slopes above the timber-line flocks of this most interesting species of the grouse family (*lagopus leucurus*) abound. They are a very valuable feature of the bird life of the Rocky Mountains park, and should be rigorously protected; more particularly the robbing of their nests should be punished. Through the main valleys connecting with the headwaters of Red Deer river are deeply worn ruts made years ago by large herds of buffalo passing to and from Bow, Red Deer and Saskatchewan rivers, showing that these sheltered valleys were their favourite wintering grounds.

Two exceptionally fine peaks, Mts. Douglas and Drummond, named after noted naturalists, rear their massive forms on opposite sides of Red Deer river. In their

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vicinity are a number of most charmingly picturesque lakes. The larger valleys of the district present rolling park lands and open pine woods, and furnish a paradise for botanists and those desiring to camp amidst beautiful mountain scenery. As a tourist resort, the locality may be recorded as one of the most attractive of the entire Rocky Mountains park.

Alpine Club of Canada.

In March of the current year the Alpine Club of Canada was organized at Winnipeg. It was based upon the principle that it should be a national institution and that its first object should be to interest the people of Canada in their own mountain regions. To this end, it was decided to hold a first annual camp at the summit of Yoho pass, in the Yoho National park, from the 9th to the 16th of July, with accommodation for one hundred persons.

At this early stage of the club such an undertaking would have been impossible but for assistance rendered from three special sources, viz.: From the Dominion Government by contributing the services of the writer's survey party, from the Government of Alberta and private persons by money contributions, and from a number of the mountain outfitters, who contributed men, horses and outfits, free of charge, to make this first camp a success. And a success it was. One hundred and twelve persons were present, among whom were representatives from England, the United States and South Africa and from numerous points throughout the length and breadth of Canada. No spot in the entire system of Canada's mountain splendours could have been found where more diverse and representative features are presented and the immediate result of that camp has been to bring the club's membership, within its first year, up to one hundred and sixty-five, with an enthusiastic demand for a repetition of the camp for next year, when the attendance promises to be much larger.

The survey party was engaged with this camp until July 18.

Amiskwi Valley and Otto Creek.

To the west of the President's range lies the valley of Amiskwi river leading over a watershed, shown on a previous explorer's map as 'Baker pass,' to Blaeberry river, and thus to the headwaters of the Saskatchewan, via the old Howse pass. About half-way between Kicking Horse river, into which the Amiskwi flows, and Baker pass, a tributary enters the latter stream from the northwest. By following the tributary to its source a pass is arrived at which likewise leads to Blaeberry river. They have been named, respectfully, Otto creek and Otto pass.

This depression cuts into the eastern edge of Van Horne range on a course parallel to its direction, and from July 20 until August 2, the party was engaged in gathering such topographical information as could be reached from it. Seven peaks were climbed and thirteen camera stations occupied. Two additional climbs were made in the Amiskwi valley and four camera stations occupied to supplement information obtained the previous season, but found inadequate owing to smoke from bush fires. During the dates above mentioned frequent showers occurred and some hail and snow fell, but not sufficient to interfere materially with the work. Both the Amiskwi and Otto creek valleys are densely timbered. Much of the timber, chiefly spruce, is of merchantable value and lies within the timber limits of the Palliser Mills company.

Valley of Otterhead River.

Van Horne range was next entered by way of Otterhead river. An old lumber road extends for about two miles up the stream, but from that point on a pony trail had to be cut out clear to the head of the valley, a distance of about nine miles through thick timber. About halfway the stream forks, a tributary coming in from the northeast. The westerly or main stream was followed to the pass at the head of the valley, which leads across a glacier to a valley discharging its waters into Blueberry river. On

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the west side of the pass stands a flat rock mass, which, seen from the direction of the valley, has a very striking appearance, rising into the air like a huge spike. Directly to the south of it an easy pass gives access to a large valley with many tributaries, all sending glacier fed torrents to feed Glenogle creek, which joins Kicking Horse river near Glenogle station on the railway.

The work was carried for some distance down on the Blaeberry side of the pass, and also into the Glenogle creek valley as far as it was possible to extend it. On the 20th the ascent of Mt. Deville was commenced, but a heavy fall of snow forced a return, and as this early snowfall entirely changed the character of the landscape for several days, the party was compelled to move on.

Altogether, between the 5th and 21st August, nine peaks were ascended and sixteen camera stations occupied. Throughout this period of the work smoke from bush fires was a highly detrimental factor. The valley is in parts heavily timbered with good merchantable spruce, but is understood to be already under license.

Moose Creek Valley.

Work was now transferred to the south side of Kicking Horse river, and a move made up the Beaverfoot as far as Ice river. A peak was climbed close to the Shining Beauty mine on the north side of the latter and two camera stations occupied. The Shining Beauty has been working steadily all summer. It employs about thirty men. The ore—silver, copper and zinc, with a trace of gold—yields about \$49 to the ton. About thirty-five tons of supplies have been packed in for winter consumption, and it is understood that the company owning it are about to put in an up-to-date concentrator.

Dense smoke on August 26 rendered photographing impossible, and compelled the party to move on up the Beaverfoot valley to Moose creek.

Moose creek, as it is locally called, is in fact the actual source of Beaverfoot river. Utilizing the smoky weather for travelling, the party went direct to the head of the valley by means of a trail leading to a mine now being operated by the Shining Beauty company. Rain on the 27th and 28th cleared the atmosphere, and on the 29th and 30th climbs were made of Mt. Sharp and Helmet Mt., both peaks being situated at the head of Moose creek.

On September 3, a climb was made of Zinc mountain. On the east slopes of this mass the mine above referred to is situated. A tunnel has been pushed in more than 200 feet and some excellent ore taken out—zinc, silver and copper—but no work is now being done except the yearly development necessary to hold it. On the 4th stations were occupied along the north edge of the Washmawapta glacier, giving data to map the glacier and also overlooking the head of the Ottertail valley and Ochre creek, tributary to Vermilion river. From the 5th to the 9th it rained incessantly, and no work could be done.

Two other stations were occupied in connection with this tract of country. In all, nine peaks were climbed and eight camera stations occupied.

Moose creek is remarkable for the large flocks of wild goat seen on the steep slopes of Mts. Sharp and Helmet and around the moraines of the Washmawapta glacier.

Beaverfoot Range.

On September 13, the party proceeded up the Beaverfoot valley and crossing the watershed camped on the headwaters of Kootenay river. From now on, until October 2, the energies of the party were concentrated upon obtaining data to map the Beaverfoot valley and inclosing ranges, and to obtain as much data as could be got from summits along the Beaverfoot range.

The Beaverfoot valley is six to eight miles wide and densely timbered. On the east side a good pony trail leads up Beaverfoot and down Kootenay river to Windermere and Steele. On the west a wagon road connects Palliser station on the Canadian

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Pacific Railway with the Palliser Mill Company's camp, about ten miles up the river. Down the centre of the valley, on the Kootenay side of the watershed, open meadows dotted with ponds extend for about eight miles. These facilities were used to move the camp, but in the case of every ascent made on either side, it was necessary to cut out from three to four miles of trail through dense woods to attain a point from which a summit could be reached. From the crests of the Beaverfoot range splendid views were obtained of the broad Columbia valley, glistening in every direction as the sun shone on winding river and innumerable ponds and channels covering the valley bottom in a network; beyond, lay the serried, snow-clad array of the Spillimacheen mountains. To cover this section, eight peaks were ascended and thirteen camera stations occupied.

All the good timber tributary to Beaverfoot river is under license to the Palliser Mill company. A tract has been burned along the northeast slopes of the Beaverfoot range, but south of the meadows previously referred to, large tracts are found on both sides of the Kootenay valley that are still intact and would be of great merchantable value if there were a waterway of sufficient volume to carry the logs. The timber is chiefly spruce and Douglas fir with a considerable quantity of pine, particularly on the northeast side of the valley.

Game is very abundant, moose and smaller deer being found in the woods surrounding the meadows referred to, where there are a number of salt-licks, and goats on all the peaks above timber-line. The crests and long ridges of the Beaverfoot range seem to be a favourite spot for goats. They were seen here in every direction in flocks, sunning themselves, and were so tame and would come so close that they could be hit by tossing a pebble. Grouse of two kinds are very plentiful in the woods and ptarmigan on the slopes above timber. Indications of a few beaver were seen around the meadows near the watershed and in Ice river valley, but they are few, and it will only be by careful protection that they will be saved from extinction.

Kicking Horse Canyon.

Between the 6th and 15th October four ascents were made along the lower canyon of Kicking Horse river and eight camera stations occupied. The weather during this period was broken and the winter snows gradually collected on the summits, so the traverse of the railway line was picked up at Glenogle, where it had been discontinued the previous year, and on days when climbing was out of the question it was carried forward westerly to Golden.

Traverse of the Railway.

From the 16th to the end of October a careful traverse of the railway was carried from Golden to Donald and ties made with established survey corners, the main camp having been moved to Moberly for this purpose. Camp was broken up on November 1, and the party returned to Calgary.

Statistics of the Season's Survey

The season was an exceptionally fine one, the field work extending over 154 days. Of these, 48 days were spent in preparing for the survey, moving camp, rest on Sundays and storing outfit; 16 days were lost through bad weather, rain or snow; 6 were lost through smoke from bush fires; and the remainder, 84 days, were spent upon the actual work of the survey.

Altogether 47 ascents were made and 89 camera stations occupied, from which 471 plates were exposed. At each camera station a round of photographs were taken and azimuths to obtain orient points for the views. To reach the peaks with instruments, 24 miles of trail had to be cut through thick timber. Along the railway, 25 miles of traverse were made between Glenogle and Donald, each course being chained twice to ensure accuracy.

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Three kinds of plates were used, viz:—Seed's non-halation L. Ortho, Lumière, non-halation A orthochromatic and Cramer's slow isochromatic. The Seed plate has a unit of exposure of five seconds with the orange screen used, the Lumière ten seconds and the Cramer fifteen seconds. The Lumière plates give the best results.

Progress of the Work.

The topographical survey of the main range of the Rocky mountains has now been completed westerly as far as Columbia river at Golden. It extends, generally speaking, twenty miles on either side of the railway, being bounded on the north by parallel $51^{\circ} 31'$ N. latitude, by the Pipestone and Bow passes and by Blaeberry river; and on the south by parallel 51° N. latitude, by the summit of the range and by the south boundary of the railway belt. In order, however, to connect with the survey of the Selkirk range, from Beavermouth to Revelstoke it is still necessary to make a survey of the Spillimacheen mountains and the Dog-Tooth range, lying between Columbia and Beaver rivers south of the railway. There also remains a portion north of the railway between Blaeberry and Columbia rivers. The Spillimacheen mountains are of considerable importance, owing to mining interests held in their midst, and there is a growing demand for maps of that region. It is proposed to fill in the gaps outlined by another season's work.

The map work of the mountain territory surveyed is now being pushed forward as rapidly as possible. The tremendous influx of tourists, hunters and those engaged in scientific research has caused the railway company to add yearly to its mountain hotels, until what were formerly small chalets are now magnificent edifices offering the most refined comforts of civilization. This influx, to which a very considerable zest has been added by the formation of the Alpine Club of Canada, means an ever increasing revenue to Alberta and British Columbia through catering to the wants of these people. There is a constant demand for accurate maps. While it is impossible to complete a map of the whole until the field work is completed, this office has been endeavouring to put out advance sheets of the parts most required by tourists, and will, during the coming winter, get ready an advance topographical sheet of Yoho park with that object in view.

I have the honour to be, sir,

Your obedient servant,

ARTHUR O. WHEELER, D.L.S.

Topographer of the Department of the Interior.

DESCRIPTIONS OF TOWNSHIPS

DESCRIPTIONS
OF
SURVEYED TOWNSHIPS

Submitted by Dominion Land Surveyors during the Season of
1906-1907

APPENDIX No. 46.

LIST OF TOWNSHIPS DESCRIBED.

EAST OF PRINCIPAL MERIDIAN.		WEST OF SECOND MERIDIAN.	
Township.	Range.	Township.	Range.
15	7	52, 53, 54, 55, 56... ..	1
14, 15.....	8	52.....	2
7, 9, 10, 14	9	44, 52.....	3
1, 2, 6, 7, 8, 9, 14, 15.	10	52.....	4
1, 2, 6, 7, 8, 9.....	11	52.....	5
2, 3, 6, 7, 12, 13, 14..	12	52.....	6
3, 4, 5, 7.....	13	52.....	7
3, 4, 5.	14	52.....	8
		7, 52.....	9
		52.....	10
		52.....	11
		52.....	12
		52.....	13
		52.....	14
		52.....	15
		52.....	16
		52.....	17
		52.....	18
		14, 52.....	19
		52.....	20
		52.....	21
		50, 51, 52....	22
		50, 51, 52.....	23
		50, 51, 52.....	24
		5, 11, 12, 50, 51, 52.....	25
		11, 12, 51, 52.....	26
		7, 8, 52.....	27
		7, 8, 9, 10, 11, 52.....	28
		7, 8, 9, 10, 11.....	29
		6, 7, 8, 9, 10, 11, 14...	30

List of Townships Described—Continued.

WEST OF THIRD MERIDIAN.		WEST OF FOURTH MERIDIAN—Con.	
Township.	Range.	Township.	Range.
51.....	1	58, 59, 61, 64.....	27
50, 51.....	2	13.....	29
21, 22, 23, 50.....	3	1, 3, 4.....	30
10, 21, 22.....	4		
21, 22.....	5		
21.....	6		
21.....	7		
21, 22.....	8		
9, 10, 11, 12.....	11		
9, 10.....	12		
29, 30, 31.....	19		
21, 22.....	27		
21, 22.....	28		
2.....	29		
WEST OF FOURTH MERIDIAN.		WEST OF FIFTH MERIDIAN.	
59, 60.....	7	1, 2, 15.....	1
59, 60.....	8	5, 13, 14, 15.....	2
59.....	9	5, 6, 7, 8, 9, 11, 12, 17, 18, 19, 20, 50, 60...	3
59, 60.....	10	10, 11, 12, 22, 56, 57, 58, 59, 60.	4
3.....	12	50, 57, 58, 59, 60.....	5
1, 3, 6, 7, 65, 66, 67, 68	13	8, 50, 51, 55, 56, 57, 58, 59, 60.. . . .	6
6, 7, 8, 35, 68.....	14	56, 57, 58, 59.....	7
6, 7, 8, 35, 68.....	15	58, 59, 60.....	8
6, 7, 8, 35, 68.....	16	26, 27.....	11
6, 7, 64, 68.. . . .	17	26, 27, 28.....	12
28, 64, 68.....	18	76, 77.....	14
64, 68.	19	75, 76.....	15
51, 59, 64, 68.. . . .	20	73, 74, 75, 76.....	16
58, 64, 68.....	21	74, 75.....	17
11, 64, 65, 68.....	22	64.,.	19
64, 68.....	23	64.....	20
64, 68.....	24	64, 80, 84.....	21
61, 64.....	25	80, 84.	22
61, 64.	26	80, 84.....	23
		80, 84.....	24
		84.....	25
		84.....	26
		WEST OF SIXTH MERIDIAN.	
		18, 20.....	24

DESCRIPTIONS OF TOWNSHIPS.

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 7.

15.—There are a few settlers immediately west of the portion of this township which I surveyed, but only a few, for the western portion of the township is nearly all muskeg. *C F. Aylsworth, D.L.S., 1906.*

Range 8.

14.—West of Brokenhead river this township is very densely settled; east of the river it is only sparsely settled. On the west side of the river the roads have all been graded and ditched; on the east side of the river none of the roads are graded and it is only partially ditched.—*C. F. Aylsworth, D.L.S., 1906.*

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TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 8—Continued.

15.—There are no settlers living east of the lands I have surveyed in this township. The land in this township, so far as I could observe, is practically all muskeg. *C. F. Aylsworth, D.L.S., 1906.*

Range 9.

7. This township is easily reached by the Dawson road from Ste. Anne, and the Sprague trail—which leaves the Dawson road in section 11, township 8, range 9, and runs in a southerly and easterly direction passing through the northeast quarter of section 36, in township 7, range 9. Both the Dawson road and the Sprague trail are in good condition. No entrance, except as above, could be made into this township with horses in summer time. The lower portions of this township are covered with a thick growth of peaty moss and the greater part of the higher portions is sandy and stony, though some parts have a thin top dressing of black loam. In general the soil of this township is not good for agriculture, though a small portion of arable land consisting of black loam on a subsoil of sandy loam or sand is found in portions of sections 21, 22, 27, 28, 32 and 33. The whole of the surface of this township is covered with bush or heavy scrub, with occasional marshes scattered throughout the township. The southeastern quarter of the township is swampy and in some places there are floating bogs or muskegs which render this portion of the township nearly impassable. The northern and northwestern portions consist of sandy and stony ridges. The timber consists of tamarack, spruce, jackpine and poplar, very little of which could be used for lumber as it is too small or too crooked. A few railroad ties and fence posts could be cut in the eastern portions of the township. Practically the whole of the central and western parts of the township have been burnt over and the timber is nearly all fire-killed, but is mostly standing yet. A small amount of coarse hay could be cut in sections 29, 30 and 31. Other small hay meadows are scattered throughout the township, but these would be suitable only for pasturage. Water is plentiful and permanent in the eastern and southern portions of the township but the northwestern portion is dry, and in a dry summer, water could be got only by digging, except for one marsh located at the northeast corner of section 30. All the water is fresh. A shallow lake, about one hundred and forty acres in area, is located at the corner of sections 1, 2, 11 and 12. Brokenhead river takes its rise in sections 35 and 36. A small branch comes out of each of the above mentioned sections and they unite in section 2, township 8, range 9. These branches at the time of survey were merely tiny streams about one foot wide and one foot deep with a slow current. No falls or rapids occur and no water-power could be developed. Practically the whole of sections 1, 2, 3, 10, 11, 12, 13, 14, 15 and 23 are more or less flooded all the time. The climate is very mild and no summer frosts occurred. Fuel consisting of tamarack, spruce and jackpine is plentiful in all parts of the township. No coal or lignite veins were seen. No stone in place was seen though surface stones and boulders were plentiful in the northwestern portion of the township. No minerals of economic value were encountered. Traces of moose and bear are plentiful, but other game is scarce.—*H. S. Holcroft, D.L.S., 1906.*

9.—This township is reached from Ste. Anne on the Canadian Northern railway, by using the Dawson road as far as section 17, in township 8, range 9. At the house of a settler named Edward Harrison, in this section, I left the Dawson road and followed Chartier's logging trail, which has a general northeasterly direction to Chartier's sawmill, in section 12, township 9, range 9, east of the principal meridian. A good trail leaves this trail in section 1 and runs north and then west to Nolin's old sawmill in section 14. This township is composed of three general classes

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 9—Continued.

of country: (1) High level ground covered with poplar, willow and windfall. This class occupies southwest half section 25, northeast half section 26, southwest half section 35, section 34, northeast quarter section 33, section 1, northeast half section 2, section 12, section 11, southwest quarter section 13, west half section 15, sections 16, 20, 21, southwest half section 29, east quarter section 30 and east half section 31. In places this class also carries a little jackpine. The soil is light and sandy, with numerous stones and boulders. (2) Swamp and muskeg, heavily covered with spruce, tamarack, and cedar, from 2 to 10 inches in diameter, and occupying southwest three-quarters section 36, northeast third section 35, northeast third section 25, section 24, north two-thirds section 13, north two-thirds section 14, section 23, southwest half section 26, northeast half section 27, east half section 15, section 10, section 3, southwest half section 2 and southeast quarter section 4. The soil is a black loam or vegetable mould. (3) Swamp and muskeg, partly open and partly covered with dead spruce and tamarack and willow scrub. This class occupies northeast quarter section 36, southwest half section 33, east half section 32, northeast three-quarters section 28, southwest half section 27, northeast half section 22, north half section 4, south half section 9, sections 5, 6, 7, 8 and 18, west half section 17, section 19, west half section 30, west quarter section 31. This is wet and marshy and covered to a depth of several feet with moss. The location of the timber is described above. The spruce and tamarack is all too small for lumbering purposes, the best having been taken out by the settlers around Ste. Anne. There is a poplar and jackpine ridge in section 12, which, however, has also been cut over. No hay is to be found. Water is all fresh and the supply abundant and permanent. A small stream enters the township on the south boundary of section 2 and crosses the east boundary of section 3 at eighteen chains north of the south boundary. It then empties into the large marsh occupying the southwest corner of the township, and is not noticeable on any other of the lines in the township. The area described above under (3) would probably be flooded to a depth of two feet in a wet season. At the time of the survey (May and June), however, water occurred only to a depth of about six inches. No water-power is available. The climate is moderate, with light frosts in the early part of June. Firewood, consisting of dead spruce, tamarack and poplar, is everywhere plentiful. The supply is sufficient for the wants of settlers for many years. No stone quarries or minerals are to be found. The game is moose, red deer, bear, grouse, porcupine, weasels and wild turkeys.—*J. L. R. Parsons, D.L.S., 1906.*

10.—This township was reached from section 34, township 9, range 9, by my own trail northerly along the east boundaries of section 4 to the quarter section corner on the east boundary of section 9. From this point my camp had to be packed by men to section 27, as the surface was of too soft and swampy a nature to allow the use of horses and wagons. The soil of the township may be divided into three general classes: (1) High ground, wooded with poplar, willow and a few jackpine. This class is sandy, with many boulders, but in a few places white clay was encountered. It is, however, of too light a quality to be suited for agricultural purposes. It comprises the northeast quarter section 32, 33, southwest three-quarters 34, 27, east half 28, northeast quarter 22, 23, south half 24, 14, 13, west half 3, 4, 6 and 7. (2) Swamp or muskeg, wooded with spruce and tamarack, or fire-killed spruce and tamarack. The soil in this class is invariably a deep black loam, but is not suited for agricultural purposes on account of the presence of a great deal of water. It can doubtless, however, be drained and should then be valuable. It comprises section 36, northeast quarter section 35, southwest three-quarters sections 32, 31, 29, west half 28, east half 26, northeast half 24, south half 22, 21, northeast quarter 20, east half 19, 11, 12, 2, northeast and southwest quarter sections 1, 10, northwest three-quarters 9, 8, northeast quarter 5 and northeast quarter 3. (3) Marsh or muskeg, containing a great deal of water, with scattered

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TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 9—Continued.

dead tamarack and scrub, and being composed of moss to a depth of several feet. It is unfit for agriculture. This class comprises southeast quarter 35, 25, north half 30, middle third of 20, east half 18, 17, 16, west half 15 and middle third 1.

The surface is level and covered with timber as described above. All the best timber has been cut in the township, but the young tamarack, spruce, poplar and jack-pine, should be large enough to cut in a few years. There is no hay. Fresh water is abundant and the supply permanent. A branch of Brokenhead river crosses section 36. It is two chains wide and four feet deep and flows with a current of about one and one half miles per hour. Its banks are well defined and flooding is therefore improbable. No water-powers occur. The climate is moderate with abundant rainfall in June (during the time of the survey), with no frosts at this time. Good fuel is everywhere obtainable among the fire-killed timber and windfall. There were no stone quarries or minerals found. Moose, red deer, bear and partridge are all quite numerous.—*J. L. R. Parsons, D.L.S., 1906.*

14.—The southeast corner of the township is crossed by Lac du Bonnet branch of the Canadian Pacific railway, a wood siding, Milner, being in section 12. The township is mostly swamp, muskeg or sand ridge, but there is a strip of good land along the west boundary and perhaps some more about the middle of the northeast quarter of the township. The latter, however, is covered with heavy woods, both green timber and brulé. A number of Galicians have settled in the western tier of sections but on account of their buildings being scattered in the scrub it is impossible for me to show the position of them in my notes. The timber is mostly spruce and tamarack, small in the wettest parts of the swamps and larger in the drier portions. All the large timber has been cut. Much cordwood is cut here every winter. I believe that this township is in a wood or timber limit belonging to J. D. McArthur. I saw no hay meadows, except those claimed by the settlers along the west boundary. The water is fresh. There is a small lake in section 24 and there are several small creeks which lose themselves in the swamps. I saw no coal, minerals or stone of any economic value. Moose, deer, timber wolves, chickens and partridges are plentiful.—*Geo. H. Watt, D.L.S., 1906.*

Range 10.

1.—The greater part of the soil in this township is useless, being only fourth class, made up, principally of floating muskegs and spruce and tamarack swamps. There are, however, about eight or ten good quarter sections in the southwest corner which, when cleared, will make good farming land. The greater part of the land is covered with bush, consisting principally of spruce and tamarack averaging from three inches to seven inches in diameter, and a considerable amount of spruce and tamarack and willow scrub, especially in the swamps and muskegs. Hay can be had in the southern part of the township, enough to supply the settlers. There are no streams of any kind to be found, but good water can be had in the swamps and by digging a few feet in almost any place. The climate is the general Manitoba climate, without any indications of summer frosts. Fuel can be had in unlimited quantities all through the district, consisting principally of spruce and tamarack. There are no coal or lignite veins, minerals or stone quarries to be found. Moose is about the only kind of game to be found. The Emerson-Vassar branch of the Canadian Northern railway runs through the northeast corner of the township. It is impossible to reach this, however, from the central or southern part of the township on account of swamps and muskegs. There is a trail leading from the settlements in the township to the west, but even this is difficult to travel on except in the winter.—*John Molloy, D.L.S., 1906.*

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TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 10—Continued.

2.—The greater portion of the soil in the township is a black or sandy loam from five inches to eighteen inches deep with a sandy clay subsoil and would be fit for farming purposes only on account of the land being so wet and almost impossible to get into. All the land is covered with bush consisting mostly of spruce, tamarack from five inches to ten inches diameter, and poplar, willow and jackpine scrub and brulé equally distributed throughout the township. The southwest quarter of the township is mostly dry tamarack about five inches diameter with low willow scrub and swamp. There are no hay meadows, but if the land was cleared and drained hay could be had in large quantities all through the township. All the water is free from alkali and of first-class quality. There are no streams to be found. The climate is the general Manitoba climate with no summer frosts. Fuel can be had in abundance all through this district, consisting of spruce, tamarack, poplar, cedar and jackpine. There are no coal or lignite veins, minerals or stone quarries. Game consisting of moose, deer and bear are very plentiful all through this section of country. A winter trail leading to Woodridge, a village on the Canadian Northern railway about two miles north, passes through the western portion of the township and continues southeast to the settlement of Pine Valley in township 1, range 12. There is a store, postoffice and school in both these places. The Emerson-Vassar branch of the Canadian Northern railway passes through the southwest corner of the township. *John Molloy, D.L.S., 1906.*

6.—This township is situated about sixteen miles northerly from Bedford station, on the main line of the Canadian Northern railway, and is most easily reached by the Mennonite trail from Bedford. This trail passes over a range of low hills, and it is a very good wagon trail. The soil in the higher parts of the township is a light sand mixed with stones and gravel in most places and is unsuitable for cultivation. The swampy portions are covered with a layer of peaty moss of varying thickness and generally have a sandy subsoil. They would have to be drained before cultivation could be successfully carried on. The whole of sections 1, 12, 13, 24, 25, 19, 30, 31 and 32, the easterly portions of sections 2, 11, 14, 16 and 23, and the westerly portions of sections 20 and 29 are swampy and covered with tamarack and spruce and are nearly level. The remainder of the township is rolling. A range of low hills passes through this township in a northeasterly and southwesterly direction, beginning at the southwest corner and passing out at the northeast corner of the township. These hills are covered with a sparse growth of small jackpine. About sixty-five per cent of the township is covered with wood, about twenty-three per cent with scrub, consisting of jackpine, willow and poplar and the remaining twelve per cent is either open or semi-open. The timber remaining in the township consists of tamarack, spruce and jackpine and a few cedar trees in sections 1 and 2, nearly all of which are under ten inches in diameter and not good enough for boards. Railroad ties could be made from the tamarack in sections 25, 24, 13, 12, 1, and 2 in the east and in sections 18, 19, 20, 29, 30, 31 and 32 in the west. The portions of this timber unsuitable for ties could be made into cordwood. Some cordwood could also be cut in sections 17, 16, 15, 14, 11, 10 and 9. A few hay meadows are scattered over the township and they produce a small crop of coarse hay. All the water is fresh and is plentiful and permanent in the swamps, but entirely absent in the higher parts of the township. There are no permanent streams. During the season I was operating in this township the climate was good; there were hot days and cool nights with no summer frosts. There was sufficient rain. Fuel consisting of tamarack, spruce or jackpine can be secured in abundance in all portions of the township. No coal or lignite veins are known to exist in the township. No exposures of rock in place and no valuable economic minerals were seen. Bear and moose are plentiful, and some few traces of deer were seen. Of the smaller game there are some ruffed grouse, prairie chicken and a

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Range 10—Continued.

great many rabbits. Timber wolves and coyotes are quite numerous.—*H. S. Holcroft, D.L.S., 1906.*

7.—This township is most easily reached by the Dawson road from Ste. Anne which passes through sections 33, 34, 35 and 36, or by taking the Sprague trail, which leaves the Dawson road in township 8, range 9, the southerly portion of the township may be reached. Both the Dawson and Sprague roads are fairly good for travelling on. About two-thirds of this township is of a light sandy and stony soil, very little of which is suitable for agricultural purposes as it is too light and dry. The remaining one-third is swampy and covered to a considerable depth with a peaty moss, all of which, at present, is too wet for cultivation and even if drained would be of very little agricultural value. The higher portions are rolling and covered with a sparse growth of jackpine or scrub. The lower portions are very nearly level and are covered with a dense growth of tamarack and spruce. Sections 31, 32, 33, 29, 28, 27, 26, 20, 21, 22, 16 and 6 and the northerly portions of sections 34, 35, 36, 15, 14 and 9 and the easterly portions of sections 19, 18 and 7 and the westerly portions of sections 23 and 25 are covered with jackpine, poplar, balm of Gilead and scrub, with a few small open places. The remainder of the township is covered with a dense growth of tamarack and spruce. About seventy-two per cent of the surface is timbered, about twenty per cent scrub and the remaining eight per cent is open or semi-open. But very little timber suitable for boards is left in this township. In the westerly portion of sections 7, 18, 19 and 30 there are a few trees over ten inches in diameter. The northern and central portions of the township are covered with small jackpine and some poplar, all of which is small and suitable only for fuel. The southeasterly portion of the township and the westerly parts of sections 7, 18, 19 and 30 are covered with tamarack and spruce, some of which would make railroad ties. The remainder is suitable only for fuel, of which there is a large quantity. Very little hay could be cut in this township. A few small hay meadows are scattered throughout the township, but the growth of grass on these is light and stunted. Water can be got near the surface in all sections except sections 31, 32, 29 and 17, in which sections it would be necessary to go to some depth for it. The supply would be sufficient and permanent. All the water is fresh. No running streams are in this township. None of the land is liable to be flooded. No head of water is obtainable in this township. The climate is good; sufficient rain, much sunshine, cool nights and no summer frosts occur. Fuel consisting of tamarack, spruce, jackpine and some poplar is plentifully distributed over the whole of the township. No coal or lignite veins were discovered. No stone in place was encountered. No minerals of economic value were seen. Moose, bear, and red deer were plentiful. Prairie chicken and partridge were found in small numbers. No traces of other game were seen.—*H. S. Holcroft, D.L.S., 1906.*

8.—This township is most easily reached from Ste. Anne station by the Dawson road. The travelling on this road is fairly good with the exception of about three-quarters of a mile of corduroy. The whole southwesterly quarter of the township and the westerly part of sections 10 and 15 are composed of sand with boulders in most places. In places the surface is covered with a thin layer of partially decomposed vegetable matter, but this layer is too thin to aid appreciably in enriching the soil. The remainder of the township is covered with a thick layer of peaty moss, in the swamps, and with matted grass roots in the marshes. All of the swamps are too wet to be cultivated until drained. If well drained the swamps and marshes would probably produce the usual vegetables and cereals of the district. The sandy portions are of too light a soil and are too dry to produce much growth. The southwestern portion of the township is rolling. The remainder is nearly level. With the exception of the marshes the whole of the township is wooded or is covered with scrub. Marshes and hay meadows occupy about eight per cent of the surface. Woods or

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Range 10—Continued.

scrub, mainly woods, cover the remaining ninety-two per cent. The larger marshes are located in sections 13, 14, 15, 22 and 23 and the northern parts of sections 31, 32 and 33, but very small marshes and hay meadows are located at intervals over all the township. A large broken marsh covered in many places with scattered willow and scrub tamarack extends throughout portions of sections 13, 14, 15, 22, 23 and 24. Located at intervals throughout the remainder of the township, with the above mentioned exception of the southwest quarter, are many marshes varying from two or three chains to fifteen or twenty chains in width. About twelve per cent of the township is covered with scrub, generally willow or scrub tamarack, spruce, poplar and balm of Gilead, with a small amount of scrub jackpine. This scrub is well distributed over the township. The best of the original timber in this township has been removed, but there yet remains a small quantity of spruce and tamarack that would make boards. Sections 4, 5, 6, 7, 8, 9, 15, 16, 17 and 18 contain practically only jackpine and poplar, all too small for boards. There is a small quantity of cedar averaging about seven inches in diameter in sections 28, 29, 30, 31, 32 and 33. Tamarack and spruce are well distributed over all the northern and eastern portions of the township, tamarack being the most plentiful. Throughout the township the tamarack would average about seven or eight inches in diameter and the spruce about six or seven inches. There is very little timber over ten inches in diameter. A portable sawmill, not at present in use, is in the northwest quarter of section 16. But little hay could at present be cut in this township. In sections 12, 13, 17 and 18 about ten tons of hay could be cut annually. A few small hay meadows are scattered throughout the township, but these produce only a very small amount of grass suitable for hay. All the water in the township is fresh. In sections 4, 5, 6, 7, 8, 9, 16, 17 and 18 some difficulty might be experienced in getting water in a very dry season, but elsewhere in the township water is permanent and can always be obtained by digging. Windy lake, a small body of fresh water about sixty acres in area, lies in sections 31 and 32, and a part of Oak lake, also fresh water, in sections 32 and 33. One small stream of clear water about three feet wide and six inches deep flows into Windy lake in section 31. This is the only running water in the township. None of the land is liable to be flooded to a serious extent, but a great deal of the lower lands would have to be drained before commencing successful agricultural operations. There is no water-power in this township. The climate during the season of operation was reasonably equable, with the exception of a fairly severe frost on the night of July 30, 1906. Fuel consisting of tamarack, jackpine, poplar, spruce and balm of Gilead is abundant in all parts of the township. No coal or lignite veins were encountered. No stone in place was encountered in this township, but boulders and stones, mostly granite, are scattered over nearly the whole township, especially in the southwest portion. No minerals of economic value were seen. Moose and bear are quite numerous. A few black partridge and ruffed grouse were seen, also a few traces of deer. No traces of other game were seen.—*H. S. Holcroft, D.L.S., 1906.*

9.—I reached this township from township 9, range 9, by the old logging trail which crosses sections 7 and 18. It was in excellent condition at the time of the survey and extended eastward across the south part of sections 20 and 21 to the southwest corner of section 22. Thence I cut a trail through sections 15, 14 and 12 to the east boundary of the township. The soil is either moss, black loam or sand. The moss occurs in the marshes and is a peaty moss extending over eighteen inches in depth. The black loam occurs in the spruce and tamarack muskegs and when drained should be splendid agricultural land. This comprises the largest part of the township. The sand is found associated with the poplar and willow bush and is valueless for agriculture, containing also many stones and boulders. The surface is everywhere covered with bush. The northern half of the township is covered

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Range 10—Continued.

with tamarack and spruce. Sections 18, 17, 16, 9, 8 and 7 are covered with poplar and willow with scattered jackpine and spruce, and the balance of the township with spruce and tamarack. The township has all been cut over, and the buildings of Nolin's old mill are still standing in the southwest corner of section 20. There is but very little timber large enough to cut at present, it being nearly all under ten inches in diameter. It should, however, in a few years grow to a valuable size if not destroyed by fire. A small quantity of marsh grass may be obtained in a hay marsh along the north boundary of section 16 and also in the south part of section 14; also a small amount of blue grass along the banks of Brokenhead river in section 36. A branch of Brokenhead river crosses section 36. Where it leaves the township it is thirteen links wide, 3 feet deep and flows at two miles per hour. The land is not liable to be flooded. Fresh water of excellent quality is to be found everywhere in the township. No water-power is available. The climate is moderate with no frosts at the time of the survey (July). An abundance of fuel is to be found in the form of dead trees. No stone quarries or minerals were found. The game is bear, moose and deer.—*J. L. R. Parsons, D.L.S., 1906.*

14.—This township is crossed by the Lac du Bonnet branch of the Canadian Pacific railway. There is a wood siding on section 28 where J. D. McArthur has a log and wood camp. The Winnipeg Electric Railway company have cleared a right-of-way 1.50 chains wide across the township on which they have erected a pole line for the transmission of electrical energy to Winnipeg. A fairly good road has also been made along this right-of-way. The greater part of the township is swamp or sand ridge which at present is unfit for cultivation. There are a few quarter sections of fairly good land in the northeasterly part of the township and near the Six-mile siding on the railway. The timber is chiefly tamarack and spruce, a great deal of which has been cut out for logs and wood by J. D. McArthur, who, I believe, has a limit extending over the whole township. On the higher ground where the timber has not been burned off completely, there is some heavy poplar and birch. There are no hay lands, running streams, stone quarries, minerals or coal that I am aware of. Game, consisting of rabbits, partridge, chickens, jumping deer and moose, is plentiful.—*Geo. H. Watt, D.L.S., 1906.*

15.—The southeasterly corner of this township is crossed by the Lac du Bonnet branch of the Canadian Pacific railway, and there is a good sleigh road from Lac du Bonnet station leading to section 25 of the township. A large proportion of the township is bog and swamp, but there are some dry ridges. The soil on the ridges is generally fair with sand or clay subsoil, except in the southerly part of the township where the subsoil is stony clay or hardpan. The heavy dead standing and fallen timber and thick underbrush are conditions that will keep settlers out for some time. The timber on the ridges has been poplar, spruce, birch and ash, but the greater part has been fire-killed and a thick growth of underbrush has sprung up. In the swamps and muskegs the timber is tamarack and spruce, mostly small, from eight inches in diameter down. The largest trees have all been cut and taken out for logs. There are meadows where hay has been cut, but the hay is coarse. The water in the swamps is fresh. There is only one sluggish stream in the eastern part of the township. There is no drainage at present, but the township could be easily drained into Winnipeg river. I saw no minerals, coal or stone of any value. Moose, timber wolves, bears, chickens and partridge are plentiful.—*Geo. H. Watt, D.L.S., 1906.*

Range 11.

1.—The soil in this township is mostly third-class, although there are a few quarter sections in the western part of the township that rank as second class, the

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Range 11—Continued.

soil being a rich black loam and clay subsoil. All of the land is covered with heavy bush, consisting principally of spruce and tamarack from five inches to ten inches in diameter, with a few small bluffs of pine and poplar averaging about seven inches in diameter. There is no hay to be found, but in the township to the east a considerable amount of hay can be secured. There are no streams or creeks in the township, but water can be obtained in almost any part of the township either in the swamps or by digging a few feet. The climate is the general Manitoba climate, with no indications of summer frosts. Fuel can be had in unlimited quantities all through this section of country, consisting principally of spruce, tamarack, jackpine and poplar. There are no coal or lignite veins, stone quarries or minerals to be found. Moose and black bear are almost the only kinds of game in this district. Good trails from the northern part of this township to the stations of Badger and Vassar to the north on the main line of the Canadian Northern railway, and to Pine Valley, a station on the Emerson-Vassar section of the Canadian Northern railway, just being erected in the township to the east. In all these places there are schools, postoffices and small country stores. The Emerson-Vassar branch of the Canadian Northern railway runs through the northern part of the township.—*John Molloy, D.L.S., 1906.*

2. Nearly all the land in this township is of third and fourth class quality, being mostly sand having about two inches of sandy loam which is unfit for producing crops. The land is covered mostly with jackpine scrub about six feet high, although there is more heavy bush in the southern portion of the township, consisting of jackpine about seven inches in diameter and some spruce and tamarack, mostly dry, about five inches in diameter scattered throughout the township. There is very little hay to be found, but it could be obtained in a few places by clearing the bush off. All of the water is of first class quality, and the supply is sufficient and permanent. It can be had by digging in almost any part of the township, except on the jackpine ridges, where it might be a little difficult to obtain it. There are no streams to be found. The climate is the general Manitoba climate, without any summer frosts. Enough fuel for present purposes can be had in the township, and the surrounding townships are well supplied with wood for fuel, consisting of spruce, tamarack, jackpine and cedar. There are no coal or lignite veins, minerals or stone quarries to be found. Game consisting of moose, deer and black bear are very plentiful all through this section of the country. A good trail passing through the eastern part of the township runs from Badger, a station on the Ontario division of the Canadian Northern railway on section 6, township 3, range 12, to the settlement of Pine Valley in section 20, township 1, range 12, where the Emerson-Vassar branch of the Canadian Northern railway passes. There is a postoffice and store in both these places, as well as a school at the settlement of Pine Valley.—*John Molloy, D.L.S., 1906.*

6.—The soil in this township if it were dry would be nearly all black loam, but as all the township with the exception of parts of sections 35, 34, 33, 27 and 28, which are sandy, consists of tamarack, muskeg and almost impassable floating bog, the soil is thereby rendered useless. The greater part of the township is covered with bush except in the southeastern part, which consists largely of floating bog with a low willow scrub. The timber varies from three to ten inches in diameter, all tamarack, with the exception of a small quantity of jackpine in the northeastern corner, and is equally distributed throughout the township. There are no hay sloughs to be found in the township, and very little hay to be had in this district. Water can be had in any part of the township without digging, and at any time of the year. There are no streams or creeks of any kind to be found. The climate is the general Manitoba climate without any indications of summer frosts. Fuel can be had all through this district, consisting principally of tamarack and spruce. No stone quarries, coal or

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Range 11—Continued.

lignite veins or minerals were found. Black bear and moose are very plentiful all through this section of country and are about the only kind of game to be found. A trail leading to Woodridge and Ste. Anne passes through the township to the west, and is always in good condition, being along the sand ridges, but it is impossible to get a team or wagon into the township in summer. I was, therefore, obliged to pack all my tents and provisions into the township from section 24 in the township to the west.—*John Molloy, D.L.S., 1906.*

7.—This township may be most conveniently reached by wagon road from Ste. Anne station on the Canadian Northern railway, from which place it is distant only about twenty-five miles. The road leading from Ste. Anne is that known as the old 'Dawson road' and is well travelled as far as Brokenhead river, a distance of sixteen miles. The township may also be reached by a wagon road from Bedford, another station on the same railway, and the distance is considerably less from this point, though Ste. Anne is the preferable supply station. The soil of this township is composed chiefly of sand on the higher portions and black muck or peat in the swamps, and almost the entire township is underlaid by sand, in some places mixed with gravel. Outside of Whitemouth river, which flows northerly through the eastern part of the township, no water was found upon the surface during the time of the survey, but anywhere throughout the township good water could be found by digging to a depth of from three to six feet. The higher portions of the township being composed entirely of sand are of little value, unless perhaps for the raising of potatoes, but the swamps when drained will probably be suited to general agriculture. Almost the entire surface of this township is covered by a growth of scrubby timber; no prairie of any account being found. The timber is of comparatively little value, small black spruce predominating in the swamps and jackpine on the sand ridges. A few tamarack are found sufficiently large for milling, and some good-sized white poplar occur, but as the greater portion of the township had been visited by fire not many years ago the existing forest is mostly young and the small trees formed into thickets of poplar, spruce, tamarack, &c. The jackpine does not seem to have been affected to the same extent as the other trees by the fire, and is therefore found of larger size, but because of its stunted, gnarly nature is unsuited for the manufacture of lumber. Some marsh hay is found in various sections of this township, notably sections 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 28, 29, 30, 32 and 33. It is of the quality commonly found in sloughs and marshes and when cut in proper season makes good feed for horses or cattle. Whitemouth river affords the chief surface supply of water on this township and is composed of good fresh water. Good water may, however, be found almost any place in the township by sinking wells to a depth of a very few feet. For the use of my men and horses I usually found an abundance at a depth of about three feet, and never found it necessary to sink more than seven feet. The water level might, however, vary very considerably during different years and seasons, the present year having been a very dry one. Whitemouth river, which in this township has an average current of only about one mile an hour, is not capable of furnishing any significant water-power. Besides the volume of the stream is quite small in this locality. The locality of this township being so near Winnipeg, the climatic conditions are similar and are, therefore, on record at the meteorological office. This township being thickly wooded with various kinds of timber, there is an abundant local fuel supply. No coal is known to exist in the locality. No stone quarries are known upon the township. No minerals are known to occur. Large game, particularly moose, were observed to be common in this township and vicinity. White-tailed jumping deer, black bears, lynx, wildcats, foxes and porcupines were also met with and are common in the locality. Few water fowls were observed, but prairie

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Range 11—Continued.

hens, ruffed grouse and spruce grouse were common. Whitefish, pike and pickerel are found in Whitemouth river.—*J. W. Tyrrell, D.L.S., 1906.*

8.—This township may be most conveniently reached by wagon road from Ste. Anne station on the Canadian Northern railway, from which place it is distant only about twenty-five miles. The road leading from Ste. Anne is that known as the old 'Dawson road' and is well travelled as far as Brokenhead river—a distance of sixteen miles. The township may also be reached by a wagon road from Bedford, another station on the same railway, and the distance is slightly less from this point, though Ste. Anne is the preferable supply station. The soil of this township is composed chiefly of sand on the higher portions and black muck or peat in the swamps, and almost the entire township is underlaid with sand, in some places mixed with gravel. The sandy sections of the township are of little value unless perhaps for the raising of potatoes, but the swampy lands being composed of a rich black muck, will, when drained, probably be suited for general agriculture. Almost the entire surface of this township is covered with a thick growth of small timber, only two or three small prairie spots having been found. The timber of this township is of comparatively little value, being small and unsuited for milling, with the exception of a few scattered tamarack. The abundance of the various trees is represented by the order in which they are named following: black spruce, white poplar, jackpine, tamarack, balsam, willow, cedar, birch and alder. The greater part of the township has evidently been swept by fire not many years ago, causing the existing forest trees to be young and small. The amount of natural hay growing upon this township is small, but meadows were noted upon the following sections: 1, 2, 3, 4, 9, 10, 11, 12, 14, 15, 16, 22, 27, 28, 31 and 32. Many of the above being very small. The quality is that of the ordinary marsh hay, which when cut in proper season makes fairly good fodder. This township contains no surface supply of water other than that found in the marshes, but by the sinking of wells plenty of good water may be obtained from the underlying sand and gravel beds. The amount of water in the marshes, and also the depth of water level in the soil no doubt varies very much from season to season and year to year. There are no water-powers. The locality of this township being so near to Winnipeg, the climatic conditions are similar—very cold in winter and hot in summer, and subject to very sudden changes. No summer frosts were experienced. Fuel in the form of various kinds of timber is abundant throughout the whole district. No stone quarries were seen. No minerals are known to occur upon this township. Large game, particularly moose, were observed to be common in this township and vicinity. White-tailed jumping deer, black bears, lynx, wildcats, foxes and porcupines were also met with and are common in the locality. Few water fowls were observed, but ruffed grouse and spruce grouse were plentiful and a few prairie hens were seen. Whitefish, pickerel and pike are found in Whitemouth river in the township to the south and east.—*J. W. Tyrrell, D.L.S., 1906.*

9.—This township was reached by my own trail from township 9, range 11, which enters the township in section 7; thence runs northerly to section 18, thence easterly and northeasterly to the northeast corner of section 17, thence easterly along the north boundaries of sections 16 and 15 to its end, 20 chains west of the northeast corner of section 15. The soil in this township is sand, black loam and moss, the sand (with boulders), occurring in the parts timbered with poplar and willow; the black loam in the spruce and tamarack muskegs and moss in the very wet muskegs. At present the soil is of no use whatever, but if the country can be drained, the areas of black loam should prove to be very rich lands. The surface is everywhere wooded, except a large open muskeg comprising section 25, east half section 26, northeast quarter section 23 and north half of section 24. The timber

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Range 11—Continued.

is very much mixed in this township, the marshes and muskegs (covered with spruce and tamarack) being separated by many small sand ridges supporting poplar and willow. There is no timber over ten inches in diameter, except that in a small area in the east part of section 1 and the southeast quarter of section 12 which contains some good tamarack, spruce and cedar. This, however, was cut over a number of years ago and the best of it taken out. A small amount of blue grass occurs on the banks of the branch of Brokenhead river which crosses sections 16, 17, 20, 29 and 30. Water of excellent quality is everywhere abundant. The branch of Brokenhead river which crosses the township has an average width of 20 links, depth of one and one-half feet and flow of one and one-half miles per hour, and its water is fresh. It runs in a well defined valley and the land is not liable to be flooded. The creek bed is a little below the general level of the township and could be used to drain the land in its immediate vicinity. No water-power is available. The climate is moderate, with no summer frosts at the time of the survey (July). Fuel is everywhere plentiful in the form of dead trees. There are no stone quarries or minerals. The game is moose and bear.—*J. L. R. Parsons, D.L.S., 1906.*

Range 12.

2. The soil in this township is nearly all third and fourth class, as it consists principally of sand with a sandy or gravel subsoil. It is almost useless for farming purposes. Nearly all the surface is covered with bush and scrub consisting principally of jackpine, spruce and tamarack from two inches to eight inches in diameter. There is scarcely any hay to be found in this township. The water is all of first-class quality, and is very plentiful in the swamps, but is difficult to get, even by digging, on the sand ridges. The land is not liable to be flooded. Fuel is very plentiful all through this district, consisting principally of jackpine, spruce and tamarack. There are no stone quarries, coal or lignite veins or minerals to be found. The principal game found is black bear, moose and deer. The township is well traversed with trails running to Pine Valley to the south, where there is a large settlement, and to the stations of Vassar and Badger, on the main line of the Canadian Northern railway, which passes through the northern part of the township. There are small stores and postoffices in these places, but no schools.—*John Molloy, D.L.S., 1906.*

3.—The northern part of this township is almost useless for farming purposes, as it consists mostly of sand ridges and swamps. The soil in the swamps is a black loam, and would be good agricultural land if cleared and drained. The surface is mostly heavily timbered, the eastern part being covered with spruce and tamarack from three inches to eight inches in diameter, and the western part with jackpine from two to eight inches in diameter. All the water is first-class quality, and is plentiful, especially in the swamps, where it can be had at any time of the year without digging. There are no water-powers in the township. The climate is the general Manitoba climate, with no indications of summer frosts. Fuel is very plentiful all through this section of country, consisting principally of spruce, tamarack and jackpine. There are no coal or lignite veins in the township, and no stone quarries or minerals. Game consisting of bear, moose and deer are very plentiful all through the district. The main line of the Canadian Northern railway passes through section 6, where the station of Badger is situated. At Badger there is a store and postoffice. The township is well crossed with trails running to the line of railway, which have been used for hauling out wood and lumber.—*John Molloy, D.L.S., 1906.*

6. There is very little land in this township fit for farming purposes, as it is mostly covered with spruce and tamarack. A few quarter-sections along the northern tier of sections are not quite as wet as the remaining part of the township. Sections

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TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 12—Continued.

3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 18, 19 and 30 are almost useless for anything, as they are nearly all covered with tamarack bluffs about three inches diameter, low willow scrub and almost impassable floating bog. The land along the banks of Whitemouth river, which enters the township on the east boundary of section 24 and leaves the township on the north boundary of section 33, is high and dry, mostly covered with poplar and thick willows, but only extends for about ten chains from the bank. The river has an average width of about forty feet and an average depth of about two and a half feet, but seems to get much deeper and wider as it leaves the township. A small stream which first appears on section 6 and passes through sections 7, 8, 17, 16 and 21, joins Whitemouth river in section 28. The greater part of the township is covered with spruce and tamarack from three to ten inches in diameter, except along Whitemouth river, where the timber is poplar, elm, birch and balsam. The only hay to be found is in small sloughs along Whitemouth river, and a considerable quantity along the creek in the sections above mentioned. Plenty of water can be had in any part of the township without digging. The land is not liable to be flooded from Whitemouth river. There are no waterfalls or rapids from which power could be developed. The climate is the general Manitoba climate, without any indications of summer frosts. Fuel can be had in large quantities all through this section of country, consisting principally of spruce and tamarack. There are no stone quarries, coal or lignite veins or minerals of any kind to be found. Moose and black bear are very plentiful through this district, and are about the only kind of game to be had. Dawson trail, which passes three or four miles to the north, is the nearest trail, but there is no trail leading into the township.—*John Molloy, D.L.S., 1906.*

7.—This township may be conveniently reached by wagon road from Ste. Anne station on the Canadian Northern railway, from which place it is distant by trail about thirty-five miles. The road leading from Ste. Anne is that known as the old 'Dawson road,' and is well travelled as far as Brokenhead river, a distance of about sixteen miles. The township may also be reached by a wagon road from Bedford, another station on the same railway, and the distance from this point is somewhat less, though Ste. Anne is probably the better supply station. The soil of this township is composed chiefly of black muck on the surface of the low lands with sandy subsoil, and upon the higher portions which are characterized as jackpine ridges both surface and subsoil are composed of sand, in some places, particularly in the north-western part of the township toward the banks of Brokenhead river—mixed with gravel and boulders. This river cuts through sections 5, 8, 7 and 31, whilst a small tributary of the same traverses sections 3, 10, 9 and 8, affording a good outlet for drainage, but until artificial drainage is employed to supplement the natural system but little of this township will be suited for agricultural purposes. The higher portions composed of sandy ridges may be suitable for the growing of root crops—such as potatoes. Almost the entire surface of this township is covered by a growth of small but in most places dense timber, no prairie being found. The timber of this township is of comparatively little value, fire having destroyed the forest not very many years ago. The existing forest is, therefore, largely composed of young trees entirely too small for milling purposes—except in spots where the fire had not reached. The several varieties of timber growing upon this township are given below in the order of their abundance: black spruce, jackpine, white poplar, tamarack, willow, alder, cedar, birch, ash, elm and balsam. A very limited amount of hay is found upon this township, as the surface is almost entirely covered by timber and scrub. Small hay marshes occur, however, upon the following sections: 5, 6, 23, 24, 25, 26, 27, 28, 31, 32, 33 and 36. This township is fairly well supplied with fresh water by Whitemouth river, which flows through sections 5, 8, 7 and 31, by a small tributary of the same which traverses sections 3, 10, 9 and 8, and by two small fresh

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Range 12—Continued.

water lakes occupying a large part of section 27. In addition to these supplies good water may be found almost any place throughout the township by sinking wells to a depth of only a very few feet. It was from such latter source that I supplied my camp with water during the prosecution of survey, the season having been an unusually dry one. Whitemouth river, which in this township has a current of only about one mile an hour, is not capable of producing any significant water-power. Besides the volume of the stream in this locality is quite small. The locality of this township being so near Winnipeg, the climatic conditions are similar, very cold in winter, hot in summer and subject to very sudden changes of temperature. This township being thickly wooded with various kinds of timber, possesses an abundant supply of fuel in that form. No coal is known to exist in the locality. No stone quarries are known to occur upon the township. No minerals of economic value are known to occur upon the township. Large game, particularly moose, were observed to be common in this township and vicinity. White-tailed or jumping deer, black bears, lynx, wildcats, foxes and porcupines were also met with and are common in the district. Very few water fowl were seen, but ruffed grouse and spruce grouse were plentiful throughout the woods, and a few prairie hens were seen in the vicinity. Whitefish, pickerel and pike as well as some other varieties of good fish are found in more or less abundance in the waters of Whitemouth river.—*J. W. Tyrrell, D.L.S., 1906.*

12.—Nearly all the land in this township that is not in the muskeg is of first-class quality, being either a sandy or black loam with a clay subsoil. The soil in the muskeg is black and would make excellent hay land if drained. The greater part of the northwestern part of the township consists of muskeg and swamp which is covered for the greater part with water averaging about one foot deep in the spring of the year. Bog river, a stream about thirty-five feet wide and ten feet deep, enters the township in section 2 and flows northwesterly up to the southwest quarter of section 14, where it loses itself and spreads out into muskeg. The portion of the township which does not consist of open muskeg is covered with bush consisting of spruce and poplar averaging eight inches diameter, and thick scrub, brulé and windfall. There is considerable hay to be found along the edge of the muskeg and banks of the river. The water is all first-class in the river and muskeg, as well as what can be had by digging from five to eight feet. There are no water-powers to be had. The climate is the general Manitoba climate, without any summer frosts. Fuel is very plentiful in this district, consisting of spruce, poplar and tamarack. There are no stone quarries, coal or lignite veins to be found. A few surface stones are to be found on sections 36 and 25. Game, consisting of moose, black bear and deer are very plentiful. The main line of the Canadian Pacific railway passes about two miles to the south. The village of Whitemouth is situated on section 36 in township 11, range 11, where there is a station, two general stores, postoffice, churches and school, and having a population of about four hundred people. The townships to the south and west are well settled by well-to-do settlers. A trail leading to Whitemouth enters the township in section 4.—*John Molloy, D.L.S., 1906.*

13.—Nearly all the land in this township is of third and fourth class, as it consists principally of spruce and tamarack swamps and muskegs, with low willow scrub. It is impossible to drive into the township except in the northern part along the south shore of Winnipeg river, where the land is somewhat higher and in places dry. The timber consists principally of spruce and tamarack, being from three inches to twelve inches in diameter, and in a few places in the eastern part jackpine and poplar are to be found. There is no hay to be found, but in the townships to the west and south, hay can be had in large quantities. Water, which can be obtained in almost any portion of the township, is of first-class quality. The water in Winnipeg river is of the very best. Along this river there are numerous rapids and waterfalls where

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Range 12—Continued.

thousands of horse-power can be developed. The climate is the general Manitoba climate with no indications of summer frosts. Fuel is very plentiful all through this district, consisting principally of spruce, tamarack, poplar and jackpine. There are no stone quarries, coal or lignite veins to be found, but in the north and east portions of the township surface stones are very plentiful, consisting principally of boulders. Moose is about the only game to be found. There are good trails in the township to the west leading to the village of Whitemouth on the main line of the Canadian Pacific railway situated on section 36, township 11, range 11, where there are schools, stores and postoffices.—*John Molloy, D.L.S., 1906.*

14.—The greater portion of this township is useless for farming purposes as there is scarcely any alluvial soil, nearly all the land being covered with stones and large boulders and rocks. The whole of the township is covered with bush, consisting of spruce, tamarack, poplar, jackpine, birch and underbrush, the average diameter being about eight inches and being equally distributed over the township. There is no hay land to be found in the township or in the adjoining townships. The water is all of first-class quality, both in Winnipeg river, Lee channel and the swamps. The land is not liable to be flooded. There are a number of rapids along Winnipeg river in this township, which could be utilized for water-powers and could be further developed by the construction of dams whereby thousands of horse-power would be available. The climate is the general Manitoba climate with no indications of summer frosts. Fuel, consisting of spruce, tamarack, poplar, jackpine and birch can be had in large quantities all through this district. Nearly all the township is covered with stone, consisting mostly of boulders. There are no minerals, coal or lignite veins to be found. Game, consisting of moose, deer and black bear are very plentiful. There is a corduroy road from Winnipeg river at Lac du Bonnet station on the Canadian Pacific railway, running through sections 31 and 32 of this township and then south along Pinawa channel to section 11.—*John Molloy, D.L.S., 1906.*

Range 13.

3. The west portion of the township is chiefly clay with more or less sand ; the other portion is sandy soil with, in some places, a mixture of clay in the subsoil. I would not consider the soil to be suitable for agricultural purposes except for hay and oats. The surface is level and is timbered with spruce, poplar, tamarack, balm of Gilead, birch and some balsam. Sections 2, 3, 4 and 5 are very well timbered with spruce, poplar, birch, balm of Gilead and tamarack up to twenty inches in diameter, considerable of which would be suitable for lumber and timber. The northerly part of the township is covered chiefly with poplar and balm of Gilead and the swamps with spruce and tamarack four inches to ten inches in diameter. Spruce is scattered throughout the township, and in the high land is generally from eight inches to fifteen inches in diameter. There is some small cedar along Mud creek in the southwest part of the township. There are some small meadows through the township and some larger ones along the shores of Whitemouth lake towards the north part of the township. The water throughout the township is fairly good and has very little, if any, alkali. That in Whitemouth lake is not as fresh as in the sloughs and creeks. There are no water-powers in the township, as there are no streams of any size, and as the country is level. The climate is good, there being no summer frosts to damage fruit or grain. Strawberries were very abundant, growing all through the township even amongst the heavy timber. Some gooseberries, huckleberries and a few raspberries are found. Through the latter part of May and a good part of June there was considerable rain which raised the water in the swamps and creeks. During the whole summer there is sufficient rainfall for the growth of crops of any kind. Wood is very plentiful throughout the township,

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Range 13—Continued.

except on a narrow strip around Whitemouth lake. No coal or lignite veins were seen in the township. No stone quarries were met with but boulders and small stones are to be found in many places throughout the township. No minerals or mineral-bearing rocks, not even outcroppings of any kind of rocks, were seen in the township. Game, such as moose, red deer, antelope, bears, wolves, foxes and small animals, is very plentiful. Ducks and geese are very numerous on Whitemouth lake. Partridges are also plentiful.—*Lewis Bolton, D.L.S., 1906.*

4.—The soil in this township is chiefly sand with very little loam, especially on the sand ridges, which are the only high lands in the township. In the swamps and muskegs there is quite a depth of moss, the subsoil being decayed vegetable matter or peat. This township is not suitable for agricultural purposes. The township is all timbered, there being no prairie. The higher parts are timbered with jackpine and some Norway pine. The pine is from six inches to sixteen inches in diameter and is fairly good for saw-logs or building timber. In the swamps, especially north of the sand ridges, there is good timber such as spruce, tamarack, poplar, balm of Gilead and a few cedar running from six inches to twenty inches in diameter. Sections 10, 11, 12, 13, 14, 15, 16, 17 and 18 are the best timbered in the township. The north half of the township is chiefly muskeg with small spruce and tamarack and is very wet and soft. Along the north side of Whitemouth lake and along Black creek there are good meadows where considerable hay has been cut this season. There are also a few small meadows throughout the township. The water is good throughout the township and there is no alkali. Black creek is the only stream in the township. It averages from four to six feet in width and about six inches in depth, though in the latter part of the summer it is considerably less. The water is fresh. The water in the muskegs is fairly good. There is no danger of the lands being flooded in this township except in a very wet season, when the low lands bordering on Whitemouth lake might be overflowed. There are no water-powers in the township, the country being too flat, and there are no streams of any size. The climate is good. There was very little summer frost and none sufficient to damage strawberries and other wild fruits, which were very abundant. Sufficient rain fell during the summer for the growth of any crop. There is plenty of wood in the township for fuel, but no coal or lignite veins were seen. No stone quarries were seen in the township but large and small rolling stones are quite plentiful, except in the muskegs. No minerals were observed nor any mineral-bearing rocks, not even outcroppings of any kind of rock were seen in the township. Game of all kinds was very plentiful, such as moose, red deer, antelope, bears, wolves and other small animals. Geese, ducks and all kinds of water fowl and partridge were also numerous.—*Lewis Bolton, D.L.S., 1906.*

5.—The land in this township is all third class. The soil is generally a black loam, but the surface is mostly swamps and muskegs, with a few high ridges which are somewhat sandy and stony. The whole of the township is covered with bush except in a few places where there is open muskeg with low willow scrub. The timber consists principally of spruce, tamarack, cedar, poplar and jackpine equally distributed throughout the township, the average diameter being about six inches. There is no hay to be found in this township, and scarcely any throughout the district. All the water is of first-class quality, and can be found in almost any part of the township either on the surface or by digging a few feet. Whitemouth river, a stream from two feet to four feet deep and about thirty feet wide, flows through the northeast corner of this township, flowing north. The climate is the general Manitoba climate, with no indications of summer frosts. Fuel is very plentiful all through this district, con-

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Range 1—Continued.

sisting of spruce, tamarack, jackpine, poplar and cedar. There are no stone quarries, minerals, coal or lignite veins in this district. Moose and black bear are about the only kinds of game to be found. There are no trails running through this township except a few winter trails, and they cannot be used as they run through the muskeg and open spots.—*John Molloy, D.L.S., 1906.*

7.—This township may be reached by wagon road from Ste. Anne station, on the Canadian Northern railway, from which place it is distant about forty miles. This road leading from Ste. Anne is what is known as the old 'Dawson road,' and is well travelled as far as Brokenhead river, a distance of sixteen miles. The township may also be reached by a road from Bedford, another station on the same railway. The soil of this township is composed chiefly of sand on the higher portions, and black muck or peat in the swamps, and almost the entire township possesses a subsoil of sand and gravel. The sandy sections of the township would seem to be of little value unless for the raising of potatoes or other root crops, but the swampy lands being composed of rich black muck will when drained be suited for general agriculture. The surface of this township is only slightly rolling, and is entirely covered by a forest of various descriptions of timber. It is unbroken by the presence of lakes or streams, except in the northeast corner of section 36 by Birch river. The timber of this township is of comparatively little value, being small and unsuited for milling, with the exception of a few scattered tamarack. The various kinds found growing upon this township are as follows, named in the order of their abundance:—Black spruce, jackpine, tamarack, white poplar, willow, alder, birch, balsam, cedar, ash and elm. The surface of this township is too much wooded to afford room for much hay land, still there are several hay marshes to be found, the largest extending in an easterly and westerly direction and occupying part of sections 14, 15, 16, 21 and 22. Other smaller marshes occur upon sections 11, 12, 13, 17 and 18, 19, 20 and 24. Except in the marshes the only other surface supply of water on this township is on section 36, which is crossed by Birch river—a sluggish stream 1.34 chains wide by six feet deep, where crossed by the east boundary of section 36. Fresh water may, however, be obtained almost any place in the township by the sinking of wells to the depth of only a very few feet. No water-power is known to occur upon or close to the township. The locality of this township being so close to Winnipeg, the climatic conditions are similar, very cold in winter, hot in summer and subject to sudden changes of temperature. This township being entirely wooded with various kinds of timber, possesses an abundant local supply of fuel in that form. No coal is known to occur in the locality. Some rock exposures occur upon sections 26, 34 and 36, and these being composed of granite it is probable that some good building stone may be found. No minerals of economic value are known to occur upon this township. Large game, particularly moose, were observed to be common in this township and vicinity. White-tailed or jumping deer, black bears, lynx, wildcats, foxes and porcupines were also seen. Very few water-fowls were seen, but ruffed grouse and spruce grouse were plentiful, and a few prairie chickens were seen in the vicinity. Several varieties of fish are reported to occur in more or less abundance in the waters of Birch river.—*J. W. Tyrrell, D.L.S., 1906.*

Range 14.

3.—This township was reached by a good wagon road which runs from Woodridge, which is on the Canadian Northern railway, into townships 4, ranges 13 and 14. The northerly portion, in fact, nearly all the township outside of Whitemouth lake was either swampy or muskeg. I had to abandon my team and wagon and use boats to move my party into the township. The soil is

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Range 14—Continued.

clay, with very little loam on the surface. That part of the township not muskeg, had the surface burnt over some years ago, killing the timber, which was chiefly cedar in this part. There is a small depth of loam with a subsoil of clay, and it would be good for agricultural purposes. But it is too flat and not high enough above the level of Whitemouth lake, and it would be liable to be flooded in wet seasons. The surface is timbered and there is no prairie. The timber is small throughout the township, averaging four inches to six inches in diameter. In the muskegs the timber is mostly dead, and small and scrubby. There is some good cedar and tamarack along the southeast side of Whitemouth lake, but it does not extend far. There is very little hay in the township, the land being too wet and marshy. The water is fairly good and is free from alkali in the small creeks and muskegs. The creeks are merely outlets from the muskegs into Whitemouth lake. There are no water-powers in the township as the country is too flat. There is not a point in the township that we visited that would be over five feet above the spring level of the lake. While surveying the township the weather was good for the season of the year, but I would consider that the township would be subject to summer frosts on account of being so low and swampy. There is abundance of wood for fuel throughout the township. No coal or lignite veins were seen. There are no stone quarries in the township. A few boulders and rolling stones were seen along the shore of Whitemouth lake and occasionally a large one in the muskegs. No minerals or mineral-bearing rocks or outcroppings of any kind of rock were seen in the township. Game of all kinds was very plentiful in the township, such as moose, red deer, bears, wolves and small animals. Geese, ducks and other water-fowl were very numerous in Whitemouth lake, and a few partridge were seen along the shore.—*Lewis Bolton, D.L.S., 1906.*

4.—This township was reached by the wagon road leading from Woodridge into townships 4, ranges 13 and 14. This wagon road crosses a succession of sand ridges running from Woodridge station on the Canadian Northern railway, to Whitemouth lake. The soil of this township is sand with very little loam except in a few places along Whitemouth river, where there is a slight mixture of clay. The high land in the township is principally sand ridges. The balance of the township is very flat and swampy, a great deal of which is very wet muskeg. The subsoil in the swamps is generally of a sandy nature. I would not consider the soil of this township suitable for agricultural purposes. The township is timbered. There is no prairie. On the sand ridges it is chiefly jackpine. In the swamps there is some poplar, spruce and tamarack, some of which is twelve inches and fourteen inches in diameter. In the muskegs it is chiefly scrubby spruce and tamarack, a great deal of which is dead. Most of the timber in the township is small, say four inches to eight inches in diameter, suitable for fuel only. In a few spots along Whitemouth river there are some spruce, tamarack, and balm of Gilead up to twelve inches in diameter. There are a few bluffs of cedar in the muskeg. There are fine hay meadows along Whitemouth river, where a number of parties have cut large quantities to feed their cattle during the winter. The water in Whitemouth river is not first-class, but can be used for domestic purposes. In the muskegs it is fairly good. There are no streams in the township except Whitemouth river, and a branch thereof rising in sections 35 and 36. This branch is larger than the outlet of Whitemouth lake, and the water is fairly good. There are no water-powers in the township, the country being too level. The climate is good and there are no summer frosts to injure small fruits such as strawberries, gooseberries, blueberries, raspberries, &c. The rainfall was sufficient for growing crops. The latter part of May and the first half of June was very showery and cloudy, with heavy thunderstorms. Wood is

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Range 14—Continued.

plentiful throughout the township, but no coal or lignite veins were seen. There are no stone quarries. Some large and small boulders were met with in the muskegs and swamps and along the river banks. No minerals or mineral-bearing rocks nor outcroppings of any kind of rock were observed in the township. Game of all kinds was very plentiful, such as moose, red deer, antelope, bears, wolves and smaller animals. Ducks, geese and other water-fowl were very numerous on Whitemouth lake.—*Lewis Bolton, D.L.S., 1906.*

5.—Nearly all the soil in this township is third class, consisting mostly of a black loam with the exception of a few ridges, where a sandy loam is found. Nearly all the township is covered with a heavy bush except in the muskegs, where a low willow scrub is found. The principal timber is spruce and tamarack, and on the ridges poplar and jackpine in addition. All the timber is equally distributed throughout the township and averages seven inches in diameter. There is no hay to be found in this section of country. All the water is of a first class quality and can be obtained easily either on the surface or by digging a very few feet. Whitemouth river, which is a stream flowing north and about thirty to forty feet wide, and two to four feet deep, flows through the southwestern corner. There are no waterfalls or water-powers to be found in the township. The climate is the general Manitoba climate, without any indication of summer frosts. Fuel is plentiful, consisting of spruce and tamarack principally, and can be obtained all through the township. There are no stone quarries, minerals, coal or lignite veins to be found in this section of country. Moose and black bear are about the only kind of game to be found, and these are very plentiful. The only trails found were winter roads and only passable during the winter months owing to the muskegs and swamps.—*John Molloy, D.L.S., 1906.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 1.

17.—The north half of this township is chiefly high dry ground, with the exception of a marsh along the shore of Shoal lake, in section 19, and a few small marshes, which were almost dry at the time the survey was being made. It is chiefly covered with small poplar and willow with a few prairie spots. In a few places poplar up to nine inches in diameter occurs, and in the eastern part of the township considerable wind-fall occurs. Section 6 and a part of sections 7, 5 and 8 are timbered with poplar from four to nine inches in diameter. Shoal lake occupies part of sections 7, 18 and 19. Around the east shore of Shoal lake the soil is very wet and several open springs occur. A large swamp occupies part of sections 9, 8 and 17. There are also large wet swamps in sections 1, 2, 3 and 12. The soil in this township is chiefly black loam on a subsoil of clay, although gravel occurs in a few places, and limestone rock comes very near the surface in places. At the quarter section corner on the north boundary of section 20, for example, solid limestone was struck in the pits at a depth of five inches, and in a ditch along the road allowance on the east boundary of section 6, limestone was uncovered at a depth of about eighteen inches for a short distance. Some fencing has been done on a small scale in this township. On the northeast quarter of section 12 a few acres of excellent wheat was grown last year. Stock-raising, however, is the chief occupation of the settlers. Plenty of hay is readily obtained from the marshes which occur in the township.—*Wm. Christie, D.L.S., 1906.*

19.—This township, though stony in places, has excellent soil, and one settler stated that he had grown fifty (50) bushels of onions on a patch about fifty (50) feet square.

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 1—Continued.

He assured me that all kinds of vegetables and grain do remarkably well here. There are two or three large marshes in this township which supply hay and water for the cattle.—*Geo. A. Grover, D.L.S., 1906.*

Range 2.

18.—About one-third of this township is occupied by Shoal lake, which crosses the township from north to south. Along the west boundary of the township sections 30, 19 and 18 are swampy, with bluffs of poplar and willow. Sections 7 and 6 are drier ground lightly timbered with poplar and willow, and having numerous patches of prairie and hay land. The east half of sections 6 and 7 and the fractions of sections 5 and 8 on the shore of Shoal lake have formerly been timbered with heavier timber which has been mostly destroyed by fire. Near the shore of the lake in sections 21, 20, 29 and 30 is a fringe of woods, principally poplar and cottonwood from five to ten inches in diameter, which would furnish some good building timber. All along the shore of the lake is a strip of land of varying width from which a considerable quantity of hay is obtained. A considerable quantity of hay is also obtained from marshes and prairie patches on almost every section on the west side of the lake. Of the portion of the township east of Shoal lake, approximately the north half is high, dry land. A strip along the lake varying in width from one-half to three-quarters of a mile is timbered with poplar from four to eight inches in diameter, while the remainder is covered with scrub poplar and willow, much of which has been killed by fire. A few marshes producing hay occur in this part of the township. The settlers on the northwest and northeast quarters of section 24 have begun cultivating the land to some extent and good crops of oats were grown last year. The north half of the portion of the township east of Shoal lake is lower ground and has more marshes and muskegs, open springs occurring in places. Hay is obtained from a strip of land along the shore of Shoal lake, but very little is to be obtained elsewhere in this part of the township. The soil in this township is chiefly black loam to a depth of six to eight inches on a clay subsoil. Ducks are plentiful around Shoal lake at the time the survey was being made, and deer were reported to be quite plentiful in the vicinity.—*Wm. Christie, D.L.S., 1906.*

Range 3.

19.—The township is covered chiefly with small poplar and willow with a few oak, and has numerous marshes and sloughs; most of the latter were almost dry at the time the survey was being made. The homestead land has almost all been taken up, chiefly by Icelanders who devote their attention to stock-raising and dairying. There is plenty of grazing land almost all over the township, and the marshes produce plenty of hay in a season that is not too wet to permit of its being harvested. Stock is not allowed to winter in the open air here as is done in the provinces farther west, but is stalled and fed all winter. I saw no attempt being made at grain-growing in this township. Most of the settlers grow a few potatoes and other vegetables for their own use; but beyond that nothing has yet been done towards cultivating the land. Shoal lake extends about three-fourths of the way across the township, entering at the southeast corner and extending northwest to section 29. There is a strip of good hay land of varying width almost all along the shore of this lake. There is practically no timber of any value, except for fence posts, &c., to be found in this township. A very limited amount of timber suitable for building might be obtained in different parts of the township, the best being on Oak island in Shoal lake, in sections 2 and 11. There is plenty of wood to provide fuel for the settlers' use for some time to come. The soil of the greater part of the township is black loam to a depth of from three to eleven inches on a subsoil of clay. The whole township is covered with drift boulders. Most

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 3—Continued.

of the settlers have obtained good water by digging wells, although in some wells the water is slightly alkaline.—*Wm. Christie, D.L.S., 1906.*

20.—The west half of this township contains a considerable amount of low swampy land, together with bluffs of poplar and willow. In the northwest quarter of the township some of the bluffs contain poplar up to nine inches in diameter. In the southwest quarter the timber is almost all scrub. The lakes shown on the plan in this part of the township are exaggerated. The eastern half of the township is somewhat higher and drier land, and is also covered with poplar and willow, the northeast quarter of the township being more thickly timbered than the southeast. A considerable portion of this half of the township has had the first crop of timber destroyed by fire, and the scrub poplar and willow that grew up in its place has also been partly killed by fire. The soil of this township is chiefly black loam on a clay subsoil. The settlers in this township devote their attention to stock-raising and dairying. I saw nothing being done in the way of grain growing. Ducks were plentiful here while the survey was being made, and some moose were also seen by members of the party.—*Wm. Christie, D.L.S., 1906.*

Range 4.

16.—This township can be easily reached by the Canadian Northern railway, which runs through the township. The soil is black loam with sand and gravel subsoil, and is adapted for dairying and raising cattle. The surface is level, and covered with bluffs of poplar, the trees averaging six inches in diameter. There is considerable hay in the marshes along lakes Manitoba and Francis. The water in the lakes and marshes is of excellent quality, being free from alkali and vegetable matter. There are no water-powers, minerals or stone quarries in the township. The climate is good, and there are no summer frosts. Poplar is obtained in sufficient quantities for fuel. Wild ducks and prairie chickens are numerous. There is a harbour of refuge under construction on section 15. An excavated channel connects Lake Manitoba with quite a large but shallow lake on section 15, and when that lake is dredged out small vessels will obtain refuge when required.—*W. J. Deans, D.L.S., 1906.*

19.—This township is of the same general character as township 19, range 3, but has on the whole less bush and, consequently, a correspondingly greater area of grazing and hay land. Much of the north half of the township has evidently been covered with timber, which has been destroyed by fire, and a second growth of small poplar and willow has sprung up in its place. The north half of the township has more prairie. The settlers in this township, as in township 19, range 3, devote themselves entirely to stock-raising and dairying, no attempt being made to cultivate the land beyond the growing of a few potatoes and other vegetables for their own use. A ditch has been dug across part of the township, draining into Lake Manitoba. It starts in section 16 and leaves the township at the north boundary of section 7. This drains a considerable area of marshy land, thus greatly increasing the area of grazing and hay land in its vicinity. The soil is chiefly black loam to a depth of from three to ten inches on a subsoil of clay. Good water may be readily obtained in any part of the township by digging or drilling wells.—*Wm. Christie, D.L.S., 1906.*

20.—This township is also covered chiefly with small poplar and willow, with numerous marshes, lakes and small patches of prairie. Much of the township has at one time been covered with heavier timber, which has been destroyed by fire, the present crop of small poplar and willow growing up in its place. The settlers are engaged in stock-raising and dairying. Plenty of hay is obtained almost all over the township. The lakes shown on the plan in the northeastern part of the township are

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 4—Continued.

greatly exaggerated. A considerable part of what is shown as water on the plan is in reality dry land covered with woods, while more of it is excellent hay land. The soil is chiefly black loam on a clay subsoil. It is very stony. Ducks were plentiful here while the survey was being made.—*Wm. Christie, D.L.S., 1906.*

23.—This township was reached from township 23, range 6, by my trail, which I cut along the south boundary of township 23, range 5. After entering the township in section 6, it runs northeasterly across sections 6, 7, 8, 17 and 16, and thence following the centre meridian, as closely as the nature of the ground permitted, to the north-east corner of section 33. This trail is very soft in many places. The soil is black loam to a depth of from four to ten inches. The subsoil varies from clay, clay and boulders to gravel. The best of it should grow all the cereals, but the land generally is best adapted for mixed farming. The surface is all bush, broken, however, by numerous marshes and muskegs. The marshes occupy about twenty per cent of the surface. The timber is chiefly black and white poplar and spruce. The spruce occurs (along with the poplar) almost entirely in the eastern half of the township. No good hay occurs. The marshes contain a coarse sour muskeg grass, but on account of the large amount of water in the marshes even this could not be harvested. Fresh water is everywhere abundant. No streams occur. At the time of the survey (November), all the marshes and muskegs were full of water. The climate is moderate. During the time of the survey winter set in, with a fall of fifteen inches of snow. This arrived before the frost, leaving the ground and marshes unfrozen. After a heavy frost, about November 18, the weather remained mild until the completion of the survey. Fuel is everywhere abundant. There are no stone quarries, and no minerals. The game is moose and elk.—*J. L. R. Parsons, D.L.S., 1906.*

24.—This township was reached from township 23, range 4, by my trail along the east boundaries of sections 4 and 9 to Sleeve lake, thence on the ice. The soil is chiefly black loam from four to six inches in depth on a clay subsoil. This should grow cereals, and is best adapted for mixed farming. The surface is bush, except where broken by Sleeve lake and the numerous large marshes surrounding and draining into Sleeve lake. Sleeve lake and the surrounding marsh covers the following sections: north half 8, 9, 10, 11, 15, 16, 17, 18, east half 19, 20, 21, south half 22, south half 28, south quarter 29, 30, 31 and 32. To the south and west of Sleeve lake the timber is poplar from four to fourteen inches in diameter, about fifty per cent of which has been fire-killed or has died of dry rot. To the north and east of Sleeve lake the timber is spruce and poplar in about equal quantities, running from four to twenty inches in diameter. There is a little tamarack in this part. No good hay occurs. The marshes contain a coarse sour muskeg grass, but these marshes were full of water at the time of the survey so that even this grass could not be cut. Fresh water is everywhere abundant. The marshes all contained fresh water, and Sleeve lake is fresh. The weather during the survey (November and December) was cold, often considerably below zero in the morning. Despite this the ground and marshes remained unfrozen, being protected by the deep snow which fell about the middle of November. Fuel is everywhere abundant. No stone quarries were found nor any minerals. The game is moose, elk and fish. In Sleeve lake are to be found great quantities of jackfish and a few English perch. Several half-breeds are now engaged in fishing there, and their catch included jackfish up to ten pounds in weight. These are teamed to Oak Point, a distance of forty miles, where they sell for two and one-half cents per pound.—*J. L. R. Parsons, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 5.

18.—This township is easily reached by a good trail from Oak Point, a station on the Canadian Northern railway. The soil generally is three to four inches of black loam with subsoil of clay and stones, and is suitable for cattle-raising and dairying. Bluffs of small timber, composed of oak, poplar and willow are fairly plentiful, the oak and poplar trees averaging about six inches in diameter. Hay is very plentiful in the marshes around the edge of the lake. The water in the lake and marshes is plentiful and of good quality, being free from alkali. The climate is good, there being no summer frosts. Fuel is scarce in the township, settlers having to go long distances for it. There are no water-powers, quarries or minerals in the township. Game, consisting of wild ducks and prairie chickens, is very plentiful. There are also many fish in the lake, which is a source of income to the settlers, who catch them in the winter time and carry them to Oak Point where there is a good market for them.—*W. J. Deans, D.L.S., 1906.*

19.—This township lies on the eastern shore of Lake Manitoba and is easily reached by a good trail which runs northerly from Oak Point, a station on the Canadian Northern railway. The westerly part of the township is an extensive marsh separated from the lake by a narrow sand beach; the rest of the township is broken by numerous hay sloughs. The soil generally is a black loam from six to eight inches deep with gravel and clay subsoil. There are numerous stony ridges running north parallel to the lake. The settlers are engaged in raising cattle and dairying. Some grain and vegetables are raised in some parts and appear to attain great perfection. There is quite a lot of poplar, though it is generally small. The settlers have to go a considerable distance for fuel. There are great quantities of hay along the marsh. The water in the marsh and lake appears to be good and free from alkali. Some seasons the water in the lake is so high that a large amount of the hay land is submerged. There are no streams in the township. There are no water-powers, stone quarries or minerals in the township. Game such as wild ducks and prairie chickens are plentiful and occasionally a deer is seen.—*W. J. Deans, D.L.S., 1906.*

19.—This township borders on Lake Manitoba, which takes off a portion of the southwest corner of the township, approximately in a line from the west boundary of section 18 to the north boundary of section 5. Along the shore of the lake is a strip nearly two miles in width, which is almost all marsh with tall rushes, reeds, and deep bogs. The remainder of the township also contains much marshy land, together with bluffs of poplar, oak and willow. A plentiful supply of hay is obtained from these marshes. The settlers in this township devote their attention to stock-raising and dairying. A limited quantity of timber suitable for building may be obtained in this township. The soil is chiefly black loam on a subsoil of clay. An extension of the Oak Point branch of the Canadian Northern railway is surveyed through this township.—*Wm. Christie, D.L.S., 1906.*

20.—The north half of this township is covered chiefly with poplar woods broken by marshes and small patches of prairie. Much of the first crop of timber has been destroyed by fire, and a recent growth of small poplar and willow has sprung up in its place. Where the woods have escaped destruction by fire there is timber varying in size up to ten inches in diameter. In the south part of the township, sections 3, 4, 5, 6, 7, 8, 9, 10, 15 and 16, are chiefly prairie broken by marshes, hay grounds and a few small poplar bluffs. Sections 1, 2, 11, 12, 13 and 14 have less swamp and are covered to a greater extent with scrub poplar and willow. The soil is principally black loam on a clay subsoil. There appears no reason why it should not be suitable for grain growing. Stock-raising, however, occupies the attention of the settlers at present.—*Wm. Christie, D.L.S., 1906.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 6.

19.—The township is easily reached by a good trail from Oak Point Settlement on lake Manitoba. The soil is generally a black loam with stone and clay subsoil. I think it would be suitable for cattle-raising and dairying. The township is level and broken by marshes ; a very extensive one lies in section 35. There are quite a number of bluffs of poplar and some oak, generally small but large enough for fencing and fuel. There are large quantities of hay in all parts of the township. The water in the marshes is fresh and good and unlimited in quantity. The climate is good and there are no summer frosts. There are no stone quarries, water-powers or minerals of any kind in the township. Game, such as wild duck abounds and there are great quantities of small wild fruit in the bluffs. The settlers are engaged in cattle-raising and dairying, and in winter do some fishing in the lake which abounds with whitefish, pickerel and jackfish. A good market is found at Oak Point for fish, which are shipped to various parts of Canada and the United States.—*W. J. Deans, D.L.S., 1906.*

20.—This township borders on lake Manitoba, about one-fifth of the township being taken off by the lake. Along the shore of the lake is a strip of marsh, much of which produces an excellent crop of hay. The remainder of the township is chiefly covered with woods, principally poplar, with a few oaks, broken by numerous marshes, muskegs and hay lands. There is plenty of timber in the township to satisfy the needs of the settlers for building purposes and for fuel. The soil is chiefly black loam on a clay subsoil. The settlers devote their attention chiefly to stock-raising and dairying, but a few attempts have been made at grain-growing in this township, apparently with success. I noted particularly an excellent crop of oats on section 20, and on section 32 an excellent crop of oats and barley was growing at the time the survey was being made. The extension of the Oak Point branch of the Canadian Northern railway also passes through this township.—*Wm. Christie, D.L.S., 1906.*

23.—This township was reached by my own trail from township 24, range 6, which enters the township from the north, at the northeast corner of section 33, and is in good condition. In the south it is entered by an old Indian hunting trail from Lundar. This trail crosses section 2. It follows the marshes and muskegs, and was very soft and wet at the time of the survey. The soil is chiefly black loam from four to ten inches on a clay subsoil. The high land would grow all the cereals but it is much broken by marshes and muskegs. The surface is all timbered but has been fire-swept recently and a great deal of the timber has been killed. Many large marshes occur in the north and west parts of the township. The timber is black and white poplar and scattered spruce from 6 to 15 inches in diameter. A great deal of it has been fire-killed and of the living poplar much of it has dry rot and is useless for lumber. Hay is not plentiful in the township. The large marshes were full of water at the time of the survey (October), and were covered with a sour muskeg grass. A few scattered hay marshes occur, however, and some good marsh grass is found to the northwest of lake No. 2, but this was too wet to cut at the time of the survey. Fresh water is everywhere obtainable in the marshes and muskegs, and on the ridges by digging a few feet. A small stream enters section 4 from the south and finds its way westward through a chain of marshes to Dog lake. No water-powers occur. The climate is moderate, with only slight frosts at the time of the survey. Fuel is everywhere abundant, in the form of standing fire-killed trees and windfall. No stone quarries or minerals were found. The game is moose, elk and duck.—*J. L. R. Parsons, D.L.S., 1906.*

24.—This township was reached by my own trail along the north boundary of section 13, township 24, range 7, thence northerly through section 19, township 24, range 6, to its north boundary, thence easterly along the north boundary of sections 20 and 21,

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 7—Continued.

thence south southeasterly across sections 22 and 15, thence south along the east boundaries of sections 10 and 3. It is a fair trail. The soil is black loam of average depth of four inches, on clay subsoil. The subsoil is, in most places, mixed with stones and boulders to such an extent that only small areas could be cultivated. The township is chiefly useful for grazing. The surface is scrubby, with scattered bluffs of poplar and spruce. Only a very small amount of timber exists in the township in the form of small scattered bluffs of poplar from one to eight inches in diameter and spruce from three to eight inches in diameter. Hay of fair quality is to be found in the numerous marshes in the township. Fresh water is everywhere obtainable in the marshes, or on the ridges by digging a few feet. No streams occur. There is no water-power available. The climate is moderate, with only a few slight frosts at the time of survey (September). Fuel is to be found throughout the township in the form of windfall and fire-killed standing poplar and spruce. No stone quarries or minerals were found. The game is moose, elk, duck and prairie chicken.—*J. L. R. Parsons, D.L.S., 1906.*

Range 7.

22.—This township is well suited for mixed farming and dairying, the soil being a rich black loam with clay subsoil. The surface of the country is gently rolling, and is well timbered with poplar, some of good size, on the ridges, and interspersed with hay meadows in the depressions. This alternation, extending as it does through the township, gives plenty of building material and fuel and good feed for stock. Game was fairly plentiful, and some of the settlers take a good many fish from lake Manitoba.—*Geo. A. Grover, D.L.S., 1906.*

23.—This township was reached from Oak Point, on the Canadian Northern railway, by the trail along the northeast shore of lake Manitoba as far as Minnewakan; thence by the old 'Indian trail' to section 9, township 22, range 7, west of the principal meridian. Both of these trails were in good condition. From this point the course is northeasterly by an old hunting trail to the northeast corner of section 16, and thence by my own trail through sections 22, 23, 26 and 35 into the southeast quarter of section 2, township 23, range 7, and thence northerly through the township. The soil is chiefly black loam of a depth of from 6 to 10 inches on a clay subsoil, and is well adapted to agricultural purposes. The presence of a large number of hay marshes makes this especially a mixed farming country. The surface is everywhere covered with bush, except where the high ground is cut by numerous narrow hay marshes and muskegs, which abound in the township. The timber is chiefly black and white poplar from six to twelve inches in diameter, with scattered spruce from six to twelve inches in diameter and a few scrubby oak. The marshes and muskegs are immediately surrounded by willow. Hay is everywhere abundant in the numerous hay marshes. It is a coarse marsh grass of fair quality. Fresh water is everywhere obtainable by digging a few feet, and was to be had in all the marshes and muskegs at the time of the survey (August). A few small streams of fresh water flow westward towards Dog lake; they frequently lose themselves in the large marshes. The land is not liable to be flooded. No water-power is available. The climate is moderate, with no frosts at the time of the survey. Fuel is everywhere to be found. At the northeast corners of sections 2 and 12, limestone was encountered in the pits six inches below the surface, apparently in place, and it was found impossible to penetrate it with pick and shovel. There are no minerals. The game is moose, elk, geese and ducks.—*J. L. R. Parsons, D.L.S., 1906.*

SESSIONAL PAPER No. 25b

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 7—Continued.

24.—This township was reached from township 23, range 7, by my own trail past the northeast corner of section 35, township 23, range 7; thence northwesterly across sections 2 and 11, to the northeast corner of section 10; thence northerly along the east boundary of section 15; thence northwesterly into section 22. This trail is in fair condition. The soil is chiefly black loam of an average depth of eight inches on clay subsoil. It is, however, intermixed with numerous large stones and boulders in many places. The ridges are broken by many marshes, muskegs and hay marshes. The country is best adapted to mixed farming. The surface is partly timbered and partly scrubby. It has been swept by at least two fires since the original survey. The only large timber left occurs on the east half of sections 3 and 10, and in sections 4 and 9. This is black and white poplar from six to twelve inches in diameter. The balance of the township is covered with poplar two to six inches in diameter, willow and small scattered groves of spruce three to eight inches in diameter. There is only a small amount of good marsh hay in the township. The numerous marshes and muskegs were very wet at the time of the survey (September), and contain a coarse, sour variety of wire grass which my horses would not eat. The upland grazing is, however, good, there being a heavy growth of peavine almost everywhere on the ridges. An abundance of fresh water is everywhere available in the marshes and muskegs. No streams occur. There is no water-power available. Fire-killed standing trees and windfall afford excellent fuel throughout the township. There were no stone quarries or minerals found. The game is moose, elk and duck.—*J. L. R. Parsons, D.L.S., 1906.*

Range 10.

15.—This township may be reached by a road running east from Gladstone, a station on the Canadian Pacific railway and the Canadian Northern railway. The soil generally is black loam from four to six inches in depth, with subsoil of clay and gravel. The surface is undulating and broken by numerous sloughs and stony ridges. The settlers are principally engaged in dairying and cattle-raising, large quantities of hay being obtainable on the land adjoining Big Grass marsh. There are a few scattered bluffs of small poplar and willow in places throughout the township. Wood for fuel may be obtained in the townships fifteen to twenty miles north. Whitemud river flows through the southwest corner of the township. This stream averages about seventy-five links in width, is three feet deep and has a current of about three miles an hour. The water is fresh, good and permanent. There are no water-powers, stone quarries or minerals in the township. The climate is free from summer frosts. Game, such as wild ducks and prairie chickens, is plentiful.—*W. J. Deans, D.L.S., 1906.*

16.—This township may be easily reached by a road running east and north from Gladstone, a station on the Canadian Northern railway. Big Grass marsh occupies a considerable portion of the northwest corner of this township. The surface is undulating and covered with numerous bluffs of poplar and willow. The soil is black loam eight inches deep with clay and gravel subsoil. The settlers are largely engaged in raising cattle and dairying, there being an abundance of hay along Big Grass marsh and in the sloughs. There has been very little effort made at grain raising, but the soil would no doubt raise oats and barley. Vegetables do well. There are no summer frosts. The climate is the same as the rest of Manitoba. There are no water-powers, stone quarries or minerals. The principal fuel is wood, which is procurable in many places throughout the township. Wild ducks and prairie chickens are plentiful, as well as larger game, such as deer and elk. Water is very scarce and of a poor quality, being highly impregnated with decayed vegetable matter, although

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 10—Continued.

cattle appear to like it and do well on it. Wild berries and plums are plentiful in the bush.—*W. J. Deans, D.L.S., 1906.*

17.—This township may be reached by a road and trail which runs east and north from Gladstone, a station on the Canadian Northern railway. Big Grass marsh occupies a considerable portion of the westerly part of the township. The surface is undulating and broken by ridges and numerous hay sloughs. There are numerous poplar bluffs throughout the township, and clumps of willow. The poplar is large enough for fuel and building purposes. The settlers are engaged in dairying and cattle-raising, there being an abundance of hay. Water is scarce, being procurable only in the sloughs, and is of poor quality, although cattle appear to thrive on it. There are no water-powers, stone quarries, or minerals. There are numerous quarter sections which would raise grain, when brought under cultivation. All kinds of vegetables do well, and are raised in considerable quantities by the settler. There are no summer frosts, and the climate is good. Wild ducks and prairie chickens are plentiful, and larger game, such as elk, moose and deer are occasionally met with.—*W. J. Deans, D.L.S., 1906.*

Range 11.

15.—This township may be reached by a good road which runs north from Gladstone, a station on the Canadian Northern and Canadian Pacific railways. The township is level. The soil is black loam averaging twelve inches in depth with clay subsoil, except the east half which is occupied by Big Grass marsh. This marsh is nearly dry in the southerly part of the township, but there are numerous ponds and soft mud flats in the northern part. There are extensive peat beds throughout the marsh, which will no doubt in time be used for fuel. Whitemud river flows through the southeast corner of the township and drains the marsh. There are a few scattered bluffs of poplar in the western part of the township, but not sufficient for fuel, which is brought in by the railway or obtained at some distance west on the Riding mountains. The township has been settled for a number of years and all available land is under cultivation or pasturage for cattle. Extensive quantities of hay are cut in the lands adjoining Big Grass marsh. Good water is not plentiful, being confined to Whitemud river, a stream about fifty links to one chain in width, and having a current of about three miles an hour. There are no stone quarries, water-powers or minerals in the township. The climate is free from summer frosts and is well adapted for growing all kinds of early vegetables. Wild ducks and prairie chickens are plentiful.—*W. J. Deans, D.L.S., 1906.*

16.—This township can be reached by a good road which runs north from Gladstone, a station on the Canadian Northern and Canadian Pacific railways. Big Grass marsh occupies the eastern half of the township. The western half is generally low level prairie, broken by numerous small hay marshes. There are a few bluffs of small poplar and willow on the west side, but the timber is large enough for fuel or for any building purposes. There are some quarter sections in the west part which are under cultivation, growing small quantities of grain and vegetables, but the principal industry of the settlers is dairying and cattle-raising. This industry is very profitable, owing to the enormous quantities of hay which grows in the township. Water is scarce, being found only in the sloughs in Big Grass marsh. The quality is such that cattle appear to thrive well on it. There are no water-powers, stone quarries or minerals. Wood for fuel is found in the townships to the north. Prairie chickens and wild ducks are moderately plentiful. The climate is good and free from summer frosts.—*W. J. Deans, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 11—Continued.

17.—This township can be easily reached by a good road which runs east from Plumas, a station on the Canadian Northern railway. Big Grass marsh occupies the eastern half of the township. The western half is undulating prairie, broken by hay sloughs, there are a number of bluffs of small poplar and willow in the west part of the township, and much larger ones north of Big Grass river, which furnish abundance of fuel for the settlers. The settlers seem to be all engaged in dairying and cattle-raising, hay being very plentiful throughout the township. Little attention is paid to the cultivation of the land, except for raising small quantities of oats and vegetables. However, there is a considerable portion of the township which would raise wheat, oats, &c. Big Grass river flows through the northern part of the township and loses itself in Big Grass marsh. This river is six to eight feet in depth, and one chain in width, with no perceptible current. The water is strongly impregnated with matter, but when boiled is good for all domestic purposes. There appears to be a sufficient quantity for all needs of the settlers. There are no water-powers, stone quarries or minerals in the township. The climate is good and free from summer frosts. Wild ducks and prairie chickens are numerous, and partridges are plentiful in the bluffs.—*W. J. Deans, D.L.S., 1906.*

18.—This township may be reached by a trail which runs easterly from Plumas, a station on the Canadian Northern railway. The surface is slightly undulating and is covered with poplar and clumps of willow. There are numerous small hay sloughs throughout the township. The soil is generally black loam with clay subsoil and is well adapted for grain-growing after the ground is cleared. The southeast corner is occupied by Big Grass marsh. The settlers are engaged in cattle-raising and dairying, there being abundance of hay in the township. Wood for fuel and building purposes is easily obtained throughout the township. The water in the sloughs is fresh and good and in sufficient quantities for the needs of the settlers. There are no water-powers, stone quarries or minerals of any description in the township. The climate is good and free from summer frosts. Wild ducks and prairie chickens are plentiful, and deer are frequently seen in the northerly portion of the township.—*W. J. Deans, D.L.S., 1906.*

Range 22.

34.—The route followed was through sections 16, 9 and 4 of township 35, range 22 and through sections 33, 34, 27 and 22 to South Duck river. The trail was very rough and through bad muskeg full of deep holes. The soil near South Duck river is fairly good and the land could be drained so that this would make good farm land. It is a loam but the subsoil is quite often rather sandy. Along the south and west side or the southwest corner some good land is found. The soil is a black loam but the surface is rather flat, so much so that the greater part of it was flooded in July. However, if this were drained it would make very good farming land and some good hay meadows. Away from the river it is nearly all swampy or muskeg and is very wet. It is of little use unless drained, which would be hard to do as the country is so flat. The surface is generally covered with scrub. Some small openings are found towards the west and south. There is no timber of any account, but a few fair-sized spruce trees, eight to ten inches in diameter are growing in the northwest corner of the township. Considerable dry standing tamarack from six to ten inches is scattered here and there over the township. Hay is fairly plentiful along the south and west sides of the township. Numerous hay meadows are found along the west side which are used by the Galicians at present. If the country were drained there would be quite large meadows available when the bush was cleared off. The hay would be only of fair quality. There are also some sloughs in the eastern part that would make hay meadows if drained. The water is all fresh and very plentiful. The only stream of any account is South

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 22—Continued.

Duck river, which is about twenty-five feet wide, two feet deep and has a current of about two miles an hour. The only wide part is where the two streams have joined about the north side of section 16; it narrows down and almost disappears in section 26. It is dammed up by beaver in several places about three feet above its usual level. The land is very liable to be flooded almost entirely except close to the wide part of the river where the banks are about five feet high and the channel is about thirty to forty feet wide. In July the greater part of the township was flooded nearly a foot deep and in some places deeper. There are no water-powers. The climate was very cold in November and December. It was 42° below zero once and often from 20° to 35° below zero. There was a great deal of snow, so much so that even, when we finished, some of the muskeg would not carry us. The frost was only in six or eight inches at the most. The only fuel is wood, but there is plenty of it and of good quality. Tamarack is the best and is scattered all over the township. No stone quarries or minerals were found. The only game seen was moose and rabbits, but there were a number of beaver in the river and the Indians were trapping lynx. The township is so flat it will not be of much use in wet years.—*W. G. McFarlane, D.L.S., 1906.*

35. The route followed into this township was from Cowan station along the south side of North Duck river by our own trail. It was rather rough on account of fallen logs, and in places it runs through grassy sloughs. We cut a road across the river in section 16 and north as far as the north chord. The river bottom has some quicksand, and the water at the ford is about three feet deep. The road north is rather rough, and when near the north chord it becomes very wet and soft, as it is all tamarack swamp. The soil is in general not very good, but there is an exception along the river. Here a good black loam and in some places a good clay subsoil is found. This would make excellent farming land. Farther back from the river it becomes very wet and swampy. Here the soil is usually a black loam about six inches deep, or the depth of the sod or moss, and usually a sandy subsoil. On some of the slight elevations covered with jackpine nothing but sand is found. Some of these parts would be too wet and others too sandy to be of much use for farming. The surface is usually scrubby, but a few large spruce and poplar trees grow along the river. In some places there is little but dry standing tamarack and windfall. The timber is chiefly spruce, with a little balsam, birch and poplar. It is from ten to twenty inches in diameter, but is not at all plentiful. It is found only near the river. Hay is fairly plentiful near the river, as there are quite a number of hay sloughs and some meadows, but these have usually considerable brush and burnt logs in them. Some of the swamps if cleared and drained would produce a considerable quantity of hay. It would be mostly of a rather coarse quality. The water is all fresh, and very plentiful and permanent. North Duck river is the only stream of any account; it is usually about thirty feet wide and on an average one and one-half feet deep. The current is about three miles an hour. It is very winding, and the banks are usually about ten feet high. Away from the river we find the country usually very level or almost flat, and nearly all of it, with the possible exception of some slight elevations covered with jackpine in sections 28 and 29, is liable to be flooded during a very wet season. The water might be about a foot deep. There are no water-powers available. The climate in October and November was very damp. We had considerable rain and a great deal of snow, some being very wet. The snowfall was so great that it kept the ground from freezing, and made it very sloppy and wet working even when comparatively frosty. The lowest temperature noted was 26 degrees below zero Fahr. Cold winds were often experienced. The only fuel found was wood. Tamarack is the best kind, and it is found in abundance over the greater part of the township. Spruce and poplar can also be had, almost anywhere. No stone quarries, and in fact very little stone of any kind was seen. No minerals were found.

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 22—Continued.

The only kind of game seen was moose and rabbits. There were also some lynx there. The township is so flat that it would be rather difficult to drain it except near the river.—*W. G. McFarlane, D.L.S., 1906.*

Range 23.

28. The route followed was almost due north from Grandview for about twelve miles, thence north and a little east going partly across country and partly following the road allowance, until we reached the south side of the township; thence by trail into it. The road was fairly good, with the exception of an occasional bad mudhole, for the first twelve miles, then it became very bad in many places. Long stretches of it are nothing but mud and water two feet deep or more, with some muskeg and a few bad creeks to cross. The trail through the township was very wet, and through a good deal of muskeg. In fact in quite a number of places we had to pack our baggage and supplies across, as the horses could scarcely get through the mud. The soil is of quite different varieties. To the south there is a great deal of muskeg and some sand, and also a few small parts of good loam. Towards the north the ground is high, and good creeks drain it. The soil there is of good quality for farming. The surface towards the south is gently rolling or flat, but at the north it is quite hilly. There is very little prairie, or in fact really none, as the open part is merely burnt off. At the south there is considerable scrub and scattered patches of spruce, tamarack and jackpine timber, but none of any great extent. Towards the north it is all heavily timbered, but will not be of use for a timber limit. There is some timber of fair size, from ten to eighteen inches in diameter. It consists of spruce, tamarack, poplar and a little jackpine, and is of fair quality but not of any great extent. Hay is very scarce and of rank slough quality. There is a little in section 10, but that is the only place noticed. Water is very abundant, and is found nearly all over the township. Much of the south part was actually flooded as well as the easterly part. In the northerly portion the water is found in good clear creeks with swift current. The water is all good and fresh, and the supply is more than sufficient and permanent. There are several good streams towards the north, not very deep or wide but with swift currents. Small water-powers might be developed from the streams to the north, but of no great value. The climate in May was usually warm, but frequent cold, windy rainstorms were experienced. No summer frosts were noticed. Fuel is very plentiful. Wood is the only kind of fuel used; it can be had almost anywhere, but is most plentiful towards the north and west where there is considerable wind-fall. No stone quarries or minerals were found, and no game was seen except rabbits, although deer tracks were noticed. It was possibly a very wet season, otherwise the south part of this township would show up to better advantage for farm land, while the north will take a great deal of work to clear it.—*W. G. McFarlane, D.L.S., 1906.*

32. The route followed from township 28, range 23, was by trail northeasterly to Ethelbert; thence northerly on the west side of the railway to Pine River station; thence westerly and a little south by trail into the township. The trail to Ethelbert was very bad; a great deal of muskeg and mudholes had to be passed through. From Ethelbert north to Pine river the trail runs along the gravel ridge and was good. Going westerly into the township it was again very bad, being nearly covered with water and swamps. The trail into the west part of the township is over some high hills and quite steep in places. The soil is of all varieties. Towards the southeast corner the land is swampy with a little loam and heavy clay subsoil. In some places there is deep muskeg. To the northeast it is usually very sandy and would not be of much use for farming. There is some very fair land, along the foot of the hills, which would make good farms, and also some towards the southwest corner of the

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 23—Continued.

township. The northern part, near Pine river is usually too rough for farm land and considerable stone and gravel is found there. The surface is all covered with scrub or timber with the exception of one or two places near the foot of the hills. In general the timber left now is not plentiful or very valuable as the best has been taken from the east and southeast parts of the township, by lumber companies. However, a few clumps of fair spruce and tamarack are scattered here and there throughout the township, leaving good timber for settlers. There is also some jackpine of fair size, but the large trees are found only in the northeast quarter of the township. Other jackpine, about three inches in diameter, is found in dense extensive groves in sections 19, 20 and 21 on top of the hills. Here the windfall is often piled fifteen feet high and so interwoven that one cannot walk through it. The high land is generally covered with jackpine, willow and poplar scrub. It is badly cut up by deep and steep ravines where the creek beds are found. Hay is not plentiful and little can be found except along the foot of the hills, and even then it is not plentiful but it is of fair quality. Very few hay sloughs were seen. Water was most plentiful and always good and fresh. The lower land was partly flooded and in the hills very many good clear little creeks were found. In the northern part of the township Pine river runs nearly across it. At times the river can be forded at the rapids without the least difficulty or danger, but an hour after a heavy rain starts it becomes a roaring torrent and is too swift to cross although even then it might not be more than four feet deep in places. The river would average about two feet deep and sixty or seventy feet wide when normal, and the current about five or six miles an hour, but when a heavy rain starts it rises rapidly to a depth of six or seven feet or even more and the current becomes much swifter. Two of my men crossed on a log one morning to dig pits on the north side of the river, but when they tried to recross an hour or two later they were unable to do so, losing their spade in the attempt. They were then obliged to walk four miles east to the railway bridge to cross it. That was all they did that day. Another day I, with three of my men, took four hours to get over. We felled tree after tree across it, but they were immediately carried off. We at last got two dry tamarack poles across and walked over on them. The river was not at its worst, then. The only parts of the land liable to be flooded badly is the southeast and eastern parts. This was flooded at times about six inches deep. On the top of the hills surface water was found standing in places but was not deep. Water-power could be developed from Pine river. There are no falls, but plenty of rapids and often steep banks of considerable height. The climate was at times warm and bright and at other times cloudy, dull and very chilly. We had a good deal of rain and one or two very heavy downpours. In fact there was no lack of moisture at any time. No summer frosts were noticed, but it was very chilly at times in June. Fuel is plentiful and can be had almost anywhere in the township. Dry tamarack and spruce are the most plentiful, but there is also a good deal of poplar. No coal was found. No stone quarries or minerals were found. Bear, moose, jumping deer and rabbits were seen and a beaver dam or two were noticed. In a dry year some parts of this township might present a much better appearance, but many of the creeks were overflowing and altogether the rainfall was quite excessive when we were there.—*W. G. McFarlane, D.L.S., 1906.*

Range 25.

6. The general aspect of the country is nearly level prairie, with bluffs of poplar and willow of small size here and there. The south portion of this township is well settled up while there are only two or three ranchers living east and south of Marshy lake. The soil is of good quality with the exception of the central portion of the township, through the hills, where it is sandy. Hay is abundant in the numerous

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 25—Continued.

sloughs and marshes of this township. There are no water-powers and no mineral has been found here. There are grain elevators at every railroad station in the neighbourhood and communications with the different great centres of the West are very easy, railroads having been built in all directions through this part of Manitoba.—*J. B. Saint Cyr, D.L.S., 1906.*

24. The route for reaching this township is by trail to Mountain Gap, thence southwesterly into the mountains in section 22. This is a good road when dry but rather heavy when wet. The soil is fine black loam with clay subsoil; it is first-class farming land. The surface is gently rolling, mostly scrubby but also some prairie here and there over all the township. There is no timber of any account, except a few spruce about twelve inches in diameter, and some poplar and willow scrub. There are quite a few fairly good hay sloughs, scattered over the whole portion surveyed, but there is very little high hay meadow. The water is fresh and abundant. There are many small streams, which may dry up in summer, but one large one, Pleasant Valley creek, is about twenty-five feet wide, four feet deep and flows about four miles an hour. There is good drainage and the land is not likely to be flooded. There is a little water-power on the large creek at the rapids but no falls. The climate is cool in May, with some frosts. There was one heavy snowstorm and plenty of rain. For fuel there is plenty of dry spruce and poplar wood almost anywhere in the township. There are no stone quarries and no minerals. Game is plentiful apparently but none was seen. Plenty of moose and deer tracks were observed. These sections are well settled. There is still some first-class land unsurveyed in the western part of the township, and there is only a little timber on the northwest corner.—*W. G. McFarlane, D.L.S., 1906.*

35.—The route followed is due south from Minitonas on the road allowance to the northwest corner of section 6. It was a rather bad road as it was not graded and had some very boggy holes in it. The soil on the north side of section 6 is very wet and chiefly muskeg, but to the south side of this section and also sections 5 and 4 the soil is good for farming. The surface has some timber on section 6, chiefly spruce from ten to twenty inches in diameter, with some poplar and birch of fair size. Sections 4 and 5 are chiefly scrubby with considerable windfall and broken up by deep ravines. The timber on section 6 does not extend to the south or east sides except an occasional tree. Hay is very scarce, but some could be had if the brush was cleared out of the sloughs in sections 5 and 4. Water is very plentiful and fresh. Numerous small streams are found but none with any large volume of water. The land is well drained in most places, except the muskeg to the north of section 6. There are no water-powers. The climate (in July) was mild and damp. We had considerable rain. No summer frosts were noticed. Fuel is plentiful. Wood is the only kind but there is plenty of it and it can be had almost anywhere. No stone quarries or minerals were found and no game was seen but traces of moose and deer were noticed. The timber in section 6 is in a timber limit.—*W. G. McFarlane, D.L.S., 1906.*

Range 26.

6.—All the land is taken up in this township, and a large quantity of very good wheat has been harvested this fall there. Hay is plentiful in this township. Though the soil is a little light, oats and wheat grow well. There are no early frosts to injure the crop. No mineral of any description has been found here during the progress of the work, and there is no timber and no water-power in this township. A portion of Marshy lake occupies the greatest part of sections 24 and 25; it is very deep in some places and the bottom is a black mud. This large sheet of water will only dry up

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 26—Continued.

completely when a ditch is made from the north end of the lake running in a north-easterly direction. Thousands of wild geese were seen there every day during the latter part of October and the beginning of November. This township can easily be reached from all directions. Farmers seem to be well off, every one of them having costly buildings and a good number of cattle and horses, with modern farm implements. Every well dug around here furnishes a good supply of soft water.—*J. B. Saint Cyr, D.L.S., 1906.*

35.—The route to reach this township from Pine river follows along the ridge on the old colonization road around the east side of Duck mountain. It had been many years since this road was used, and in the meantime dry logs about fifteen inches in diameter had fallen across it in great numbers, necessitating a great deal of chopping to clear it again. Besides this there were a great many soft holes, and some of the old bridges were so rotten on the top that they had to be rebuilt before we could cross them. It took us four days to make the move. The latter part of the road runs due south on the road allowance to the sawmill on section 1, township 35, range 26; thence by a very soft log road into section 2. The soil is usually very good, being a black loam with clay subsoil. Towards the west and north of the part surveyed, and also along the south side, it would make first-class farm land, although a little heavily timbered at present. Through the centre of this part there are some muskegs and swamps, but in a dry year this would likely become fairly solid, and at any rate could be comparatively easily drained into Favel river or Minitonas creek, which have a very good fall. When drained this may make good farm land too. Hay is very plentiful in sections 10, 11, 12 and some in 2 and 3. It is rather scarce towards the west side of the township, but the greater part of what is to be found is of very fair quality. The water is all fresh and very abundant especially in the easterly part. The supply is quite sufficient and permanent. Favel river and Minitonas creek are worthy of mention. Favel river is about twenty feet wide and one foot deep, and has a current of three or four miles an hour. Minitonas creek is scarcely as large. Some of the sections, such as parts of 11, 12, 1 and 2, may be flooded at times. In fact beavers are flooding some of them now about one foot in depth. No water-powers of any great value can be obtained, but Favel river might be used for a small one, as its banks are steep at the south boundary of section 1. The climate was mild and warm, but there was considerable rain. Some days were very hot. No summer frosts were experienced during July. Wood is the only fuel, but it is plentiful in all parts of the township. No stone quarries or minerals were found. No game was seen except rabbits, but moose and deer tracks were found, and also beaver dams and freshly cut trees. The timber of value is chiefly confined to sections 1, 2 and 3, and is now a timber limit. It consists chiefly of spruce from ten to twenty inches in diameter and some birch ten inches, balsam twelve inches and poplar about ten inches in diameter. Some of it is very good. There is also some timber on the westerly part which will be good for settlers.—*W. G. McFarlane, D.L.S., 1906.*

Range 27.

6.—The eastern half of this township is nearly level prairie; it is thickly settled. The country is rolling and somewhat stony and gravelly for a mile or two adjoining the west outline.—*J. B. Saint Cyr, D.L.S., 1906.*

7.—This township can be reached by the Arcola branch of the Canadian Pacific railway which runs through it from east to west. The soil is a rich black loam. Nearly the whole of the township is under cultivation, raising the best quality of wheat. The surface is rolling and void of timber or scrub of any kind except along

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 27—Continued.

Pipestone creek which flows through the northeastern part of the township. Along its banks are some large elm and poplar. Hay is rather scarce in the township, there being only a few small sloughs in which it grows. The water in Pipestone creek is fresh and of a good quality, and the supply is permanent and sufficient for all domestic purposes. The creek averages about a chain in width and three feet in depth, and has a current of about three miles an hour. The banks are high so that the surrounding country is not flooded to any extent in the spring. There are no water-powers, stone quarries or minerals in this township. The chief fuel is coal, which is brought in by the railways. The climate is about the same as the rest of Manitoba and there are no summer frosts. Reston, a village of considerable importance, is located in section 9. A large amount of business is transacted there by the settlers, who are in a very prosperous condition owing to the exceeding richness of the soil. Game, such as wild ducks and prairie chickens, is plentiful, and Pipestone creek is widely known throughout the province as a resort for wild geese.—*W. J. Deans, D.L.S., 1906.*

Range 28.

5.—This township is easily reached by a road which runs south from Sinclair, a station on the Arcola branch of the Canadian Pacific railway. The surface is rolling. The soil, generally, is black loam, from eight to eighteen inches deep, with clay subsoil, and is well adapted for grain growing. There is no timber of any description, but a small amount of scrub grows around the sloughs. There is sufficient hay for the settlers' requirements in the numerous small sloughs throughout the township. The Canadian Pacific Railway company is constructing a branch line through the township, which was graded at the time of the survey, but no rails were laid. There are no stone quarries, water-powers or minerals in the township. Jackson creek, a small stream, flows through the southern part of the township. This stream is dry, except in places where there are a few pools. The water is good and free from alkali or minerals. Another small stream, which is also dry except in a few places, flows through the northeast corner of the township. The principal fuel is wood and coal, which is brought in from outside points to the nearest railway station. The climate is good and free from summer frosts. Wild ducks and prairie chickens are moderately plentiful.—*W. J. Deans, D.L.S., 1906.*

6.—This township may be reached by a good trail running south from Sinclair, a station on the Canadian Pacific railway. The surface of the township is rolling, void of timber or scrub of any description. The soil throughout is a black loam averaging from six to eight inches in depth with a clay subsoil. There are a few stony ridges in the township which, however, do not detract from the grain raising qualities of the land. Hay is plentiful in the numerous small sloughs throughout the township and is sufficient for the needs of all the settlers. A creek of fresh water flows southerly through the central portion of the township, entering on the north boundary of section 32 and leaving again on the south boundary of section 3. This stream expands in many places into pools where good fishing may be had, jackfish especially being very plentiful. The water is good and permanent, amply sufficient for all domestic purposes. Fuel consists of wood and coal, brought in from outside points by the railway. There are no water-powers, stone quarries, or minerals in the township. The climate is the same as the rest of Manitoba and free from summer frosts. The only game found is wild duck and prairie chicken, which are moderately plentiful.—*W. J. Deans, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 28—Continued.

7.—This township may be reached by the Arcola branch of the Canadian Pacific railway. The soil is generally a black loam with clay and gravel subsoil, and is suitable for wheat growing, large quantities of which are raised. The surface is rolling prairie void of timber or scrub. Sufficient hay for the need of the settlers is procured in the numerous sloughs throughout the township. There is a small stream of fresh water in the westerly part of the township which disappears beneath the surface in numerous places and reappears in pools. These pools, however, are not of a permanent nature and would probably disappear in dry seasons. There are no water-powers, stone quarries or minerals in the township. The climate is good and free from summer frosts. The settlers burn wood and coal, which is procured from outside points and brought in by the railway. Wild ducks and prairie chickens are moderately plentiful. There are quite a number of stony ridges throughout the township but the stones appear to be only on the surface and do not depreciate the value of the land for grain raising.—*W. J. Deans, D.L.S., 1906.*

8. This township may be reached by the Canadian Pacific railway, a branch of which runs from Reston to Wolseley. The soil generally is a deep black loam with clay subsoil. The township is rolling prairie void of timber or scrub, except a few elm and poplar which grow along Pipestone creek, a stream running through the northeastern part of the township. This stream averages from fifty to a hundred links in width, two to four feet in depth, with a current of about three miles an hour. The water is fresh and good and is also permanent and sufficient for all domestic purposes. The banks are high generally, so that only a small portion of the land in the valley would be flooded in the spring. There are no water-powers, stone quarries or minerals in the township. The climate is the same as the rest of Manitoba and free from summer frosts. The fuel consists of coal and wood brought in by the railway. Game, such as prairie chicken and wild duck, is moderately plentiful and geese in large numbers seek this part in the fall of the year. Bardell, a railway station and postoffice, is assuming considerable importance as a commercial centre.—*W. J. Deans, D.L.S., 1906.*

Range 29.

5. This township is easily reached by a road running south from Sinclair, a station on the Arcola branch of the Canadian Pacific railway. The surface is rolling and broken by numerous small sloughs. The soil is black loam from eight to eighteen inches deep with clay subsoil. There is no timber of any description, except along the south boundary, where there are a few bluffs of small poplar. This township is well adapted for the growing of grain, and the settlers are all engaged in grain growing. Two small streams flow southerly through the township. These streams at the time of survey were dry with the exception of occasional pools. The Canadian Pacific Railway company is constructing a branch of their road through this township. Hay is moderately plentiful in the numerous sloughs. Good water can be obtained at a depth of eight or ten feet by digging. There are no water-powers, stone quarries, or minerals of any description. The climate is good and free from summer frosts. The settlers are largely dependent on the railways for their supply of fuel, which is brought from outside points. Wild ducks and prairie chickens are moderately plentiful.—*W. J. Deans, D.L.S., 1906.*

6. This township may be reached by a trail which runs south from Sinclair, a station on the Canadian Pacific railway. The township is rolling prairie destitute of scrub or timber of any description. The soil generally is a black loam averaging in depth from six to eighteen inches with a clay subsoil. There are a few ridges which are inclined to be stony, but apparently these do not detract from the producing qualities of the soil, as I saw excellent wheat growing on land which was quite stony

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 29—Continued.

in places. There is sufficient hay for the settlers' requirements in the numerous small sloughs throughout the township. Jackson creek flows southerly through the centre of the township and Graham creek flows through the southwest corner. These creeks in dry seasons have no current, but consist of numerous apparently disconnected pools; the water is fresh and good and in sufficient quantities for the settlers' requirements. The principal fuel is wood and coal, which is brought in by the railway from outside points. There are no water-powers, stone quarries, or minerals in the township. The climate is the same as the rest of Manitoba, and free from summer frosts. Wild duck and prairie chicken are moderately plentiful.—*W. J. Deans, D.L.S., 1906.*

7. This township may be reached by the Arcola branch of the Canadian Pacific railway, which runs through it from east to west. The surface is rolling and broken by a number of small sloughs and stony ridges, particularly in the westerly part. The easterly part of the township is much better, and largely under cultivation, growing wheat of the best quality. A small stream runs through the township, which disappears beneath the surface in many places and reappears again in pools. The water in these pools is fresh and good, but in a very dry season would probably disappear. The settlers are principally engaged in grain growing, there not being sufficient hay to engage largely in dairying or cattle-raising. There is no wood in the township, but a few scattered clumps of willow grow around the sloughs. There are no stone quarries, water-powers or minerals. Good water may be obtained by digging to a depth of from ten to twelve feet. There are no summer frosts. Early vegetables do well and attain great perfection. Game, such as wild duck and prairie chicken, is moderately plentiful. Sinclair, a village of about one hundred inhabitants, is located on section 13. It has an elevator, three stores and a few other business places. Fuel and lumber for building purposes are brought in by the railway from outside points.—*W. J. Deans, D.L.S., 1906.*

8. This township is easily reached by a road which runs north from Sinclair, a station on the Arcola branch of the Canadian Pacific railway. The surface is rolling and greatly broken by small sloughs and hay marshes. The soil is black loam from four to eighteen inches in depth with clay and gravel subsoil. There is no timber or scrub of any description. The settlers are principally engaged in growing wheat, of which they produce large quantities of the best quality. The Canadian Pacific railway has recently constructed a line from Reston to Wolseley which runs through the northeast corner of this township. Sufficient hay is found in the numerous sloughs for all requirements of the settlers. A small stream flows through the easterly part of the township, in a southerly direction, this stream at the time of survey was dry, except for a few pools which contained good fresh water. In a dry season these pools probably would disappear; but good water can be obtained in unlimited quantities at a depth of eight or ten feet. The settlers are largely dependent on the railway for their supply of fuel, which is brought in from outside points. There are no water-powers, stone quarries, or minerals of any description. The climate is the same as the rest of Manitoba and free from summer frosts. Game, such as wild duck and prairie chicken, is moderately plentiful.—*W. J. Deans, D.L.S., 1906.*

9. This township is, for the most part, open rolling prairie. The portion, sections 24, 25, 26, 34 and 35, through which Pipestone creek passes, is much more broken and is also dotted with bluffs of poplar and willow. Numerous sloughs occur all over the township, many of which were dry at the time of survey. The soil is generally a black loam of from eight to fourteen inches in depth, with a clay subsoil, though some of the sections in the western portion are quite stony. The crops were good, both wheat and oats apparently doing well on the cultivated portion. The Wolseley

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TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 29—Continued..

branch of the Canadian Pacific railway crosses the township diagonally from southeast to northwest and will be in operation this fall. The townsite of Ebor, in section 15, has been laid out and several buildings are in course of construction there, among others a large grain elevator. Both the Canadian Northern railway and the Grand Trunk Pacific railway have made surveys for railways westerly to Regina through the township, but the lines are not yet finally located. Pipestone creek averages in width about one chain, about two feet in depth, with a current of about three miles an hour; the banks are high and the valley quite narrow, so that only a small portion would be inundated by the floods in the spring of the year. The water is fresh and of good quality, permanent and sufficient for all needs of the settlers. There are no stone quarries, water-powers or minerals of any kind in the township. Fuel is scarce and the settlers depend on the railway companies to bring them in wood and coal from outside points. The climate is the same as the rest of Manitoba and free from summer frosts. Prairie chicken and wild duck are numerous, and jackfish abound in Pipestone creek. Fruit, such as wild plums, saskatoon berries, raspberries and cranberries, is very plentiful. Hay is found in sufficient quantities throughout the township for the requirements of the settlers.—*W. J. Deans, D.L.S., 1906.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 1.

52. *North outline.*—The westerly third of this township is very rough and broken, being in the Pasquia hills. This part consists of hills and valleys, the hills being two hundred to three hundred feet above the valleys and the whole many hundreds of feet above Carrot river, which flows easterly some six miles to the north of this township. Mountain creek flows in a valley three hundred feet deep and crosses close to the northwest corner of the township. The timber is nearly all birch with poplar and spruce in less quantity. The middle third is rolling and falls rapidly to the east. The easterly third is undulating and swampy with a thick growth of spruce and tamarack. Besides Mountain creek the only other stream of any size crossing the north outline is a branch flowing northeast across section 34 to Waskwei river. The timber in this township is not generally more than ten inches in diameter.—*J. N. Wallace, D.L.S., 1906.*

53. *East outline.*—The southwesterly part of the township is in the Pasquia hills, is very rough and broken and is thickly timbred with birch, poplar and spruce. The remainder of the township is flat and swampy and near the northeast corner is all bogland or tamarack swamp.—*J. N. Wallace, D.L.S., 1906.*

54. *East outline.*—Carrot river flows northerly close to the east outline through sections 1, 12 and 13, crossing the outline three times. Along its banks the lands are heavily timbered with cottonwood and poplar with a few spruce, but back from the river there are extensive open flooded areas. Section 24 is thickly timbered with spruce eight to ten inches in diameter. Section 25 is open, wet slough land, and section 36 is also very wet with willow bushes and small tamarack.—*J. N. Wallace, D.L.S., 1906.*

55. *East outline.*—Along the east of sections 1, 12 and 13 the land is level and wet, being composed generally of tamarack bogs, although the north half of section 12 and the south half of section 13 may prove good land if drainage can ever be carried out. The north half of section 24 and all of sections 25 and 36 are generally thickly timbered with ten-inch spruce and poplar, and willow trees. A remarkable old river channel about one hundred feet wide coming up from the southwest crosses

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 1—Continued.

sections 25 and 36. It is now full of dead water, but apparently it was at one time the channel of some river. There are many such old channels in the district, to which the Indians apply the generic term 'Petabek.'—*J. N. Wallace, D.L.S., 1906.*

56. *East outline.*—Sections 1 and 12 are composed of level lands with a dense tangled growth of tall willow with bluffs of poplar. Sections 13 and 24 are generally open slough land with willow, and the south half of section 25 is thickly timbered with poplar and willow along the south bank of Saskatchewan river. Birch river crosses about the centre of section 12, and the winter mail route from Cumberland House to The Pas mission crosses the east of section 24.—*J. N. Wallace, D.L.S., 1906.*

Range 2.

52. *North outline.*—The whole of this township is in Pasquia hills. It is all rough broken country. The hills are two hundred to three hundred feet above the valleys and the whole area is from nine hundred to fourteen hundred feet above Carrot river, which flows easterly some six miles to the north of this township. The timber is dense and consists of birch, poplar and a few spruce. Fully three-quarters of the timber is birch. The township is altogether too rough for settlement. There is probably no grass in these hills.—*J. N. Wallace, D.L.S., 1906.*

Range 3.

44. *Section 28.*—The route to this section is along the Prince Albert branch of the Canadian Northern railway to Etoimami, a small station on this line, thence south along a 'tote' road used by lumber camps in the vicinity. Said road crosses the 12th base line about one and one-half miles south of the railroad at this point. The soil is generally very sandy and of poor quality, with a substratum of alluvial gravel. There are patches of good black mud in the swampy parts, but these would have to be drained. The surface is wholly covered with scrub, poplar and spruce, and is generally undulating and facile for roads. The greater part of the section is covered with small scrub pine. The spruce is small and of little value. The timber on the east half of the section is mostly small scrub pine. The southwest quarter is a willow swamp with patches of poplar. Along the banks of Red Deer, Etoimami, and Fir rivers are dense willow with poplar and a few spruce and birch. There is no hay. The water of the three rivers mentioned is fresh and of excellent quality, and the supply appears to be permanent. Red Deer river is about six feet deep and two hundred and fifty feet wide, with a fairly swift current, and the Etoimami is two hundred feet wide and about the same depth. Fir river is one hundred feet wide and about four feet deep. The volume of water will vary according to the season, and in the Fir may dwindle down to a mere stream. There is little possibility of floods as the banks are high. There are no falls, but water-power could be developed by damming. The general indications are that the summers are hot, with probably early fall frosts. The winters are bearable, as good shelter is afforded by timber. There are no indications of coal deposits. Settlers must rely upon the timber for fuel, which for this purpose is fairly plentiful. There are no stone quarries, but there is alluvial gravel throughout the section. No minerals occur. The game consists of rabbits and partridge, with a few ducks and geese.—*R. J. Jephson, D.L.S., 1906.*

52. *North outline.*—The northwest quarter of this township is hilly, being on the lower slopes of the Pasquia hills. The remainder is in the hills, and is very rough and broken, being composed entirely of hills and valleys. The whole is thickly timbered with birch, spruce and poplar, and is too rough for settlement. It is probable that there is absolutely no grass in these hills.—*J. N. Wallace, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 4.

52. *North outline.*—Carrot river flows north across the middle of section 34. The part of the outline west of this river is entirely across sloughland, all more or less flooded. The land is quite useless until some system of drainage on a large scale lets the water off the surface into either Carrot river or Sipanok channel, when the soil would probably be found to be very good. Such a scheme is undoubtedly feasible at some future time when this district becomes more settled. The east half of the outline is in a timbered district. The land is here marshy, and irregularly covered with patches of spruce, poplar, willow and tamarack. A large stream, called Rice river, flows westerly along the eastern portion of the outline, coming from Pasquia hills and flowing to Carrot river. It is reported to have a high waterfall some miles to the southeast.—*J. N. Wallace, D.L.S., 1906.*

Range 5.

52. *North outline.*—The line runs through an area of continuous sloughland, all more or less under water, and is quite unfit for cultivation until drained on a large scale into Carrot river, which should be a feasible operation when the progress of settlement justifies a large outlay. Carrot river is considerably lower than the standing water in the sloughland and would afford a good basis for a system of drainage. There is also Sipanok channel to the north which could be similarly utilized. The land is not swampland, or bog, but pure sloughland. Indian reserve No. 28A and the Shoal lake branch of Pas Mt. Hudson bay post, are in this township. All kinds of garden produce grow very well here. There is no summer frost.—*J. N. Wallace, D.L.S., 1906.*

Range 6.

52.—*North outline.*—The line runs entirely through an area of sloughland. Slough grass and reeds are the only vegetation, with a willow bush here and there. There is, however, a very marked belt of timber along the banks of Carrot river. This belt, about one hundred yards wide on each side, consists of comparatively dry land about fifteen feet above the level of the water in the river. It is probably to be accounted for by floods in years gone by having cast up and deposited the soil carried down by the water. The timber belt forms a very marked feature of the landscape, and serves to identify the position of the river when seen miles away. The greater part of Indian reserve No. 29A, and the Hudson bay post called Pas Mountain or Red Earth are in this township.—*J. N. Wallace, D.L.S., 1906.*

Range 7.

52. *North outline.*—Except a small poplar ridge at the east end of section 31, the whole of the lands along the north outline are more or less under water. Section 31 consists almost wholly of a very bad bog. The remaining five sections are sloughland. There is practically no vegetation over this sloughland, except long slough grass and reeds. The district is a vast slough, and is worthless until some system of drainage on a very large scale is carried out, when the soil will likely prove to be good. The easterly part of Indian reserve No. 29A is in this township. Carrot river would supply a feasible basis for drainage as it is below the level of the standing water on these lands.—*J. N. Wallace, D.L.S., 1906.*

Range 8.

52. *North outline.*—Except section 36, the whole of this north outline is across an uninterrupted series of flooded bogs, swamps and muskegs extending in all directions. There is no drainage apparent, not a single creek being crossed on the whole

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 8—Continued.

six miles of the outline. The surface is all moss-covered. Section 36 is covered with eight-inch poplar and spruce on a local ridge and is dry land.—*J. N. Wallace, D.L.S., 1906.*

Range 9.

7.—This township may be reached by a good trail from Stoughton on the Arcola branch of the Canadian Pacific railway. The soil is a black loam with clay subsoil and is well adapted for wheat growing; farmers engaged in that business raise large crops of excellent quality. The surface is rolling prairie, void of scrub or timber of any kind. There are a number of sloughs scattered throughout the township in which a considerable amount of hay is cut. In the southern part of the township there is a stream; but at the time I was there it was dry except for pools in places. The water was fresh and free from alkali. The climate is free from summer frosts. Wood for fuel or building can be obtained on Moose mountains at a distance of twenty-five miles north, and lignite is mined twenty-five miles to the south. There are no stone quarries, minerals or water-powers in the township. Game such as wild duck and prairie chicken is plentiful.—*W. J. Deans, D.L.S., 1906.*

52. *North outline.*—Section 31 is fair land, is dry and is covered with a mixed growth of large poplar and spruce. Section 32 is swampy and moss covered, with small spruce and tamarack. The easterly four miles cross an uninterrupted area of flooded bogs, muskegs and swamps extending many miles to the north and south.—*J. N. Wallace, D.L.S., 1906.*

Range 10.

52. *North outline.*—The westerly four miles are first-class land, sections 31 and 32 being covered with eight-inch poplar and sections 33 and 34 with willow trees. Except for a small poplar ridge near the northeast corner of the township, sections 35 and 36 are swamp land, covered with spruce and tamarack, but south of these sections the land improves somewhat.—*J. N. Wallace, D.L.S., 1906.*

Range 11.

52. *North outline.*—Section 31 is generally dry and rolling and is covered with light poplar. Section 32 is lower land and there is a good deal of marsh covered with willow, but there is no swamp land. Sections 33 and 34 and the west half of 35 are pure bog. Very extensive swamps stretch to the north and south. The east half of section 35 and all of section 36 is first class land with a thick growth of poplar or tall willow trees. Petaigan river flows north to the Saskatchewan across section 35. The winter mail route from Fort à la Corne to Cumberland House crosses the bogland in section 34.—*J. N. Wallace, D.L.S., 1906.*

Range 12.

52.—*North outline.*—Saskatchewan river flows for five miles almost along the north outline. All the north sections, except 36, are much broken by the river and by its channel around Birch island which last contains two or three square miles. The timber along the river is very heavy, consisting of spruce up to thirty inches and cottonwood up to four feet in diameter, but it does not extend far back from the river. The Saskatchewan varies in width near the north outline from over eight hundred yards to only two hundred and seventy-five yards. The shores are soft and muddy. The outer banks are one hundred to one hundred and seventy-five feet high. The only unbroken section along the north is section 36, which contains some good land on its east half.—*J. N. Wallace, D.L.S., 1906.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 13.

52.—*North outline.*—Sections 31 and 32 are the best land along the north. The remainder of the outline passes through an undulating country generally lightly timbered with willow marshes and bluffs of poplar or jackpine. The soil becomes very sandy near Saskatchewan river. The northeast corner of the township is on an island in the river. There is very little swamp land.—*J. N. Wallace, D.L.S. 1906.*

Range 14.

52. *North outline.*—Sections 31 and 32 are very sandy and are much broken by the valley of Torch river. Section 33 is better land but is a good deal broken by the same river. Section 34 is good land and is nearly open country. South of this section there is much open burnt country, with a few small poplar. Section 35 is very swampy with a wet mossy surface. Section 36 is good with a light mixed growth of willow and poplar and patches of spruce.—*J. N. Wallace, D.L.S., 1906.*

Range 15.

52. *North outline.*—The area of large timber which extends across the easterly half of range 16 ends about the middle of section 31 in this range. The outline generally runs through a rolling, partly open country, consisting of very sandy elevations covered by a few small jackpine, alternating with lower lands with small poplar and willow. Across section 36 the soil is pure sand, and is almost barren, although there is a light growth of small jackpine. Torch river, a stream one hundred and ten feet wide with a swift current and a gravel bed, rises in Candle lake and flows southerly close to the township corner. It, however, turns back and ultimately flows northeast. The central part is the best of the northerly portion of the township.—*J. N. Wallace, D.L.S., 1906.*

Range 16.

52. *North outline.*—Section 31 is swamp land with small spruce and tamarack. The west half of section 32 has a large hay meadow in which Fern creek rises, a stream which flows easterly and then southeasterly. There is heavy spruce timber on sections 33, 34, 35 and 36 especially on the west half of 36 where it runs to thirty inches in diameter. There is much fallen timber on section 34. The soil is generally second and third class across this range. A pack trail from Whitefox river to Torch river crosses section 35.—*J. N. Wallace, D.L.S., 1906.*

Range 17.

52. *North outline.*—The westerly four miles are generally covered with poplar and willow, with local tamarack swamps. Section 36 is all swamp land with a thick growth of small spruce. There is heavy poplar and spruce timber along the west of Kelsey creek, a stream which flows south to Whitefox river, through sections 35 and 36. The westerly part of this range is the best.—*J. N. Wallace, D.L.S., 1906.*

Range 18.

52. *North outline.*—The westerly three and one-half miles are covered with willow or bluffs of large poplar, and the soil is generally good. There are many willow marshes but no bogs or swamps. The remaining two and one-half miles to the east corner are very swampy, and there are extensive bogs. Only one small creek, four feet wide, flowing southeast, crosses the whole six miles. A pack trail from Whitefox river to Torch river crosses section 36.—*J. N. Wallace, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 19.

14. In this township I found that the lake shown on sections 3, 4, 8 and 9 is entirely dried up, and that the whole area is now a very excellent hay marsh on which hay in great quantities is being cut. The lake shown on sections 10, 11, 14 and 15 is all dried up except a pond on parts of sections 10 and 15, the area of which is about 55 acres. The balance is entirely dried up, and parts on sections 11 and 14 is also an excellent hay marsh. The eastern parts of sections 10 and 15 are covered with rank weeds. I produced the lines of the adjoining section through the lakes and dug pits in order to mark the true corners, connecting the pits on each side of the lakes by straight lines. The whole area, with the exception of the pond, would be quite available for hay land. The parts of the land in sections 10, 11, 14 and 15 could be quite easily drained by cutting a drain or ditch along the side road into the pond, which would help to keep up the supply in the pond. This pond is of great value as it is the only water that can be had for a great distance except in wells.—*James Warren, D.L.S., 1906.*

52. *North outline.*—The whole of the north outline is through coniferous timber. The lower lands are bogs and swamps; the remainder is sandy elevations covered with jackpine. Only one small creek, two feet wide and flowing southeast, crosses the whole six miles, so that the lands have no drainage. The rainfall runs into the depressions and remains there till evaporated, forming bogs and swamps. About sixty per cent is under water, more or less deep. The entire surface is moss covered. The east half of section 36 is the only poplar area, and is dry.—*J. N. Wallace, D.L.S., 1906.*

Range 20.

52. *North outline.*—The westerly four miles crosses a district entirely covered with coniferous timber, with the usual accompaniment of a mossy surface. The lower lands are tamarack bogs and spruce swamps; the rest (a few feet higher) are bluffs of small jackpine. There is a remarkably sudden change of timber in section 35, where poplar and leaf loam take the place of the coniferous trees and moss. The poplar here run to twenty inches in diameter, with much undergrowth of alders and cranberry. Only one small creek crosses the whole six miles. There is practically no slope for drainage. A pack trail (a very good one) from LaCorne to Torch river crosses section 35.—*J. N. Wallace, D.L.S., 1906.*

Range 21.

52. *North outline.*—The northwest corner of this township and the west half of section 31 come in Birchbark lake. The east half of section 31 and the west half of 32 are heavily timbered and hilly. The remainder of the outline to the northeast corner traverses some extensive swamps, the higher lands being sandy elevations with small jackpine. The surface is practically all moss covered. There are a few partially open dry areas, but they are covered with dead small timber and the soil is almost barren. Along the north outline it is a very poor district. Only one creek about six inches wide crosses the whole six miles.—*J. N. Wallace, D.L.S., 1906.*

Range 22.

50. This township lies about twenty-five miles by trail in an easterly direction from Prince Albert. It can be reached by following the Fort à la Corne trail to township 49, range 22, from there taking a branch line crossing Saskatchewan river, and entering this township in section 6. The condition of this trail is good. This township can also be reached by following the Candle lake trail to township 51, range 23 and from there taking a branch trail running in an easterly direction to section 31

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22—Continued.

of this township. This trail is in poor condition. The western half of this township consists of a black or black sandy loam about sixteen inches deep with a sand subsoil. It should be excellent soil for mixed farming. The eastern half is composed entirely of sand. The surface is of a varied nature. From the southwest corner, extending in a northeasterly direction, is a large patch of prairie covered with scrubby poplar and willow. To the north of this, the land is more heavily timbered with poplar from two to eight inches in diameter and some willow. The eastern half is covered with jackpine, spruce and birch, interspersed with willow and jackpine scrub. The timber consists of jackpine and poplar. On sections 1, 4, 9, 10, 12, 15, 23, 24 and 25, jackpine will be found large enough for tie purposes. It averages from two to sixteen inches. The poplar is too small for building purposes. Small hay sloughs are found all over the township. On the north, from a large muskeg extending across the township, large quantities of hay of a second quality can be obtained. Water is of good quality, wherever found. The eastern half is poorly supplied with water. A large muskeg is found on the north of the township. A creek with excellent water, and which runs the entire year enters on section 7 and leaves on the south of section 5. It has steep banks about fifty-two feet high where it leaves the township. There is no water-power. The climate is mild, the first frost being noticed on August 22, while open water was frozen on November 15. Fuel in the form of dead wood is obtainable in any part of the township. No coal, stone or mineral was noticed. Prairie chickens were very numerous.—*R. H. Montgomery, D.L.S., 1906.*

50. The northwest part of this township is broken by muskeg, sand ridges and hay sloughs. It is timbered with scrub poplar and willow on the sides of the ridges and large scattered jackpine on the tops. There are several strips of tamarack swamps along the margins of the muskegs. In the southwest corner of the township the land rises to an elevation of about eighty feet above the level of Saskatchewan river. Section 6, west half of section 5, and south halves of sections 7 and 8 are high and undulating. The soil is a heavy clay loam, the subsoil being a sandy clay. There is no timber of any account on these sections, except a spruce bluff on the northeast corner of the northwest quarter of section 6, of about twenty-five acres in extent, suitable for building purposes. There is a small creek coming from a muskeg in the northwest part of the township, probably a continuation of the creek crossing through township 50, range 23. It runs in a southeasterly direction through sections 20, 16 and 5, and flows into Saskatchewan river. The northeast part of the township is level and rising gently towards the east. It is timbered with a dense growth of poplar and balm of Gilead, two to five inches in diameter. The soil is a black sandy loam with a deep deposit of vegetable mould; the subsoil is a sandy loam. The southeast part is high and undulating. Sections 1, 12 and 14 are timbered with jackpine and interspersed with poplar. Sections 2, 3, 11 and 10 are covered with a dense growth of young jackpine, there being an occasional small bluff of large jackpine, which escaped the fires that burned over this area in 1886. There is much half burned and decayed pine timber scattered over the above sections. Sections 4, 9 and the east half of 5 are covered with muskeg. This soil is for the greater part pure sand. I am of the opinion that this township should be surveyed as there is a considerable quantity of good land in the northeast part. The southeast part, being near good timber, would induce many settlers to take the land that is not highly esteemed.

GENERAL.

The six townships which I have reported, viz. : townships 51, ranges 22, 23, 24 and 25, and townships 50 ranges 22 and 23, west of the second meridian, lie in one of the choicest and most extensive valleys in Saskatchewan, being from twelve to

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

GENERAL—*Continued.*

twenty miles wide and extending east between Candle lake and Saskatchewan river to the outlet of Torch river into Saskatchewan river in township 57, range 4, west of the second meridian. Whitefox river flows through the centre of the valley from township 51, range 23, and enters Torch river twenty miles east of Candle lake. Torch river, with its increased volume, is fifty feet wide, one and a half to three feet deep, and has a stony bed; the current is also greater and is from four to six miles per hour. There are good facilities for making use of the water-power on this stream. The valley is bounded on the west by a chain of sandy hills extending north from Saskatchewan river to the second tier of sections, running east and west in township 50, range 25, and by Little Red river in township 51, range 26. On the south it is bounded by a chain of sand ridges extending from township 49, range 23, to Nipawin point, along the north side of Saskatchewan river and north from four to two miles. These hills are timbered with poplar, spruce and jackpine; on the north side it is bounded by a chain of ridges that extend from Little Bittern lake near the south boundary of township 54, range 26, then in a southeasterly direction to near the northeast boundary of township 51, range 23, and in a northeasterly direction towards Little Candle lake. There is a considerable area of good agricultural land in the broken country north of township 51, ranges 23, 24 and 25, and I am impressed that large and prosperous settlements could be established there. There are several very fine lakes which contain pickerel, pike and mullet. Moose, elk and red deer are very plentiful. There are rich deposits of marl, suitable for the manufacture of cement, distributed over the country, north and east of Little Red river and with abundance of timber, clay and water-power, there are few places where cement could be produced as cheaply. There are very heavy belts of spruce timber surrounding Birchbark, Loon and Candle lakes, which are situated in the midst of the broken area. The portions that are most densely timbered have been taken up as timber berths. These I have been informed will be operated next year, affording employment for several hundred men during the winter and sawing seasons. A branch of the valley forks off and crosses Saskatchewan river between Lobins rapid and Torch river portage, and extends in a southeasterly direction until it merges into the delta of the Saskatchewan. Sipanok channel flows from Saskatchewan river through the valley and enters Carrot river in township 53, range 2. The valley is timbered on the east side of the channel with spruce, poplar and very large birch, extending back for a distance of from three to eight miles. There is a long open space on the west side of Sipanok channel in which there is room for a large settlement. The soil is very suitable for agricultural purposes. There are narrow strips of timber at intervals, which are suitable for building purposes.—A. L. Robertson, *Forest-ranger*, 1906.

51. The topography of this township is level, with long gentle undulations, suitable for drainage. It is more densely timbered than township 51, range 23, with poplar, balm of Gilead and willow along the margins of the hay meadows. There are a few small bluffs of spruce along Whitefox river. There are long, narrow reaches of openings on the west half of the township. The east half is covered with small poplar, and a few small hay meadows in the southeast part. The soil is a rich black loam, the subsoil alternating from sandy loam to a heavy clay. Whitefox river enters the township on section 19, and a tributary stream enters on section 30. The tributary joins Whitefox river on the northwest quarter of section 20. It then flows in a southeasterly direction, passing diagonally through sections 21, 15, 13 and 12, and crossing the east boundary of the township about twenty rods north of the northeast corner of section 1. The land in this township is excellent, and where timbered would be easily cleared as the timber is small. It is well adapted for mixed farming. There are no permanent sloughs in the township.—A. L. Robertson, *Forest-ranger*, 1906.

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 22—Continued.

52. *North outline.*—Sections 31 and 32 are the best. These have a general growth of poplar mixed with a few spruce, and there are many willow sloughs. The remaining sections are either swampy, with tamarack or spruce, or consist of bluffs of jack-pine, and are practically all moss covered, except a narrow belt of poplar land close to the west shore of Birchbark lake. The northeast corner of the township comes in the middle of Birchbark lake. This lake is some seven miles long, north and south, and is about one and one-half to two miles wide. It empties northerly by a small stream flowing into Candle lake, which is reported to be about fifteen miles north of Birchbark lake. There are extensive swamp areas to the southwest of this lake, and some very fine timber around its southern extremity.—*J. N. Wallace, D.L.S., 1906.*

Range 23.

50. The southeastern part of this township is high land, broken by hills and ridges which are sparsely timbered with coarse cull jackpine and large scraggy poplar. The soil on the tops of the hills is sandy and on the sides is sandy clay. Some of the valleys are densely timbered with small poplar and balm of Gilead two to five inches in diameter. In other valleys there are long reaches of good hay meadows with dry, hard and even surfaces. The soil in the valleys is black sandy loam, with a sandy subsoil. The northeastern portion of the township is broken by sand ridges running east from sections 22 and 27, crossing the east boundary of the township into township 50, range 22. The hills are timbered with rough jackpine and scrub poplar. In the valleys there are hay meadows, muskegs and willow. The west half of the township is situated in a valley which runs to the outlet of Torch river. It is timbered with poplar, from two to five inches in diameter. There are open spaces here and there, which were burned over, also hay meadows. This part of the township is undulating and sloping towards the northeast. There is a small creek which flows from a muskeg in township 49, range 23, crosses the south boundary of the township on section 4 and runs in a northeasterly direction and is lost in the muskegs in the northeast part of the township. This west half of the township is well drained and dry. There are several small bluffs of spruce along the banks of the creek, suitable for building purposes. There is a good trail leading into this part of the township, which crosses section 32 from the Candle lake trail. The west half of the township is well adapted for mixed farming. The soil is a black sandy loam, with a sandy clay subsoil.—*A. L. Robertson, Forest-ranger, 1906.*

51. This township lies in a valley and is timbered with poplar and balm of Gilead, two to ten inches in diameter. Not more than ten per cent of this timber will go over six inches. There are small bluffs of spruce, suitable for building purposes, varying from one to five acres in extent scattered over the township. The township is honeycombed with openings, some being stretches of hay meadow with dry smooth surfaces. Other openings were caused by forest fires and are from ten to two hundred acres in extent, on which willow, hazel and scrub poplar are growing, interspersed with hay, peavine and vetches. The township is drained by Whitefox river, which is ten feet wide and twelve inches deep, with a current of two to three miles per hour. The river has a stony bed. The water is clear and free from alkali. The river enters the township at section 22, passing through a muskeg on this section and continuing through sections 29 and 21, then running in a southeasterly direction to the south boundary of section 23, then in a northeasterly direction through section 24, crossing the west boundary of the township on the southwest quarter of section 24. Another creek enters this township, on section 34. It is ten feet wide, twelve to eighteen inches deep, with a current of two to three miles per hour, and having good clear water and a stony bed. It flows south through the east half of section

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 23—Continued.

34, through section 26, then southeast to the centre of section 25, passing out of the township about twenty rods south of the northeast corner of section 25. The Candle lake trail enters the township on section 7, and continues in a northeasterly direction through sections 18 and 17 to the centre of section 20, then north through sections 20 and 32, crossing the north boundary of the township about thirty rods east of the northeast corner of section 31, leading from section 29 in an easterly direction to section 24. The soil is a deep black sandy loam with a subsoil alternating from sandy clay to heavy clay. This township is suitable for mixed farming.—*A. L. Robertson, Forest-ranger, 1906.*

51. This township lies some twenty-five miles northeast from Prince Albert. Candle lake trail passes through it, entering on the west boundary of section 7 and leaving on the north boundary of 32. This trail is very heavy and rough and the opening up of a good road is one of the first requisites of this township. The soil is composed of black loam sixteen inches deep with clay subsoil. There are occasional sand ridges towards the south of this township. The surface is covered with poplar from four to six inches in diameter and willow and large hay sloughs. This land will readily adapt itself to farming of a mixed character. On sections 25, 26, 32 and 33 scattered spruce, averaging from eight to twenty inches in diameter and on sections 9, 10, 11, 14, 15, 26 and 27, poplar eight to sixteen inches will be found. This timber should be reserved for building purposes. Large hay sloughs of good quality will be found all over the township. The water is all fresh. Beaver creek passes across the northeast corner of the township, entering on the north of section 34 and leaving on the east of section 25. Several creeks are tributaries to it. On the whole a good natural system of drainage is worked out. Beaver creek in this township is ten feet wide and one foot deep, becoming stagnant in dry seasons. Apparently in wet seasons this township has been entirely flooded. There is no water-power. The climate is mild, the first frost being observed on August 25 and the first snowfall on November 5. There is plenty of dead wood for fuel. No coal or minerals were found. Stone was found along the creek beds. Partridge, deer and moose were very plentiful. There are timber berths northeast of this township and when these are developed the settlers of this township will receive a ready market for their produce.—*R. H. Montgomery, D.L.S., 1906.*

52. *North outline.*—Sections 31 and 32 are partly covered with poplar, some of which is eight inches in diameter, and partly with willow sloughs. The soil is generally good. A well known open area called 'Whitefox plains' occurs in section 32. The road from Prince Albert to Candle lake traverses this open area, and crosses the north outline of the same section. Section 33 is marshy, with willow sloughs and some bluffs of heavy spruce. Section 34 is high land and appears to be a good section. Sections 35 and 36 are covered with small spruce and jackpine and are swampy.—*J. N. Wallace, D.L.S., 1906.*

Range 24.

50. This township can be reached by Candle lake trail, which enters it on the west boundary of section 19, and leaves it on the north boundary of section 33, being some nineteen miles northeast from Prince Albert. It can also be reached on the south by a trail which I made, leaving the Candle lake trail at the southwest corner of township 50, range 25, running due east, entering the township at the northwest corner of section 6, being some fifteen miles from town. The condition of both trails is poor. The soil is a very heavy rich black loam. The township is entirely covered by bush and scrub, consisting of poplar, spruce, tamarack and jackpine, with poplar scrub and willow. There are numerous small groves of spruce, good timber averag-

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 24—Continued.

ing from four to thirty inches all over the township. A large portion has already been cut for ties. In the northeast corner of the township there are immense hay sloughs, the hay being of a second class quality. On the whole the land is very low, and generally speaking under water, with the exception of that immediately adjoining Garden river, which enters the township on the west boundary of section 19, flowing southeast and leaving on the east boundary of section 1. It has good water and is about forty feet wide, four feet deep and running about two miles per hour. As the river is some ten feet below the general level of the country, most of the land can be drained by a slight amount of local improvements, such as the building of ditches. This would leave immense hay meadows of first-class soil. There are no water-powers. The climate is mild, there being considerable rainfall during June and July. There is abundance of fuel, but no mineral or stone of any description. Numerous duck, deer and moose are to be found in the township.—*R. H. Montgomery, D.L.S., 1906.*

51. This township lies in the valley, is level, and well drained by two creeks, which enter the township on the north boundary, one on section 33 and the other on section 35. They flow in a southerly direction and come together on section 15, continuing south through the fifty-mile muskeg which enters the township at section 35, then passing through sections 35, 26 and part of the west half of 14, 10 and 3. The muskeg varies from a half to one mile in width. In some places it is covered with a dense growth of willow, and can be crossed in safety with a loaded wagon at any season. At other points it is a quaking bog and unsafe to cross except in winter. The land on the east side of the muskeg is a deep rich black soil, with a sandy loam subsoil. It is timbered with poplar, balm of Gilead, a few scattered spruce and willow along the margin of the muskeg. The openings in this part are hay meadows with dry smooth surface, extending back from the edge of the muskeg, which lies lower than the land on either side, and appears to have been the bed of a very large stream or lake which had been filled up. There are no permanent sloughs in this township. In going over this township I crossed a number of dry water-courses, leading into the creeks and muskegs and from hay meadows, which accounts for the good condition of the meadow surfaces. The land west of the muskeg is level, and had been thickly timbered at one time with poplar and balm of Gilead. Forest fires burned over the area many years ago, leaving long narrow strips of timber extending from east to west, this giving the country a park-like appearance. In the open spaces willow, hazel and good hay are growing. The soil is a deep black sandy loam, except a small area in section 22 near the muskeg, and that is light sandy loam with a sandy subsoil, and a few scattered jackpine growing here and there.—*A. L. Robertson, Forester, 1906.*

52. *North outline.*—The surface is generally undulating, and the timber almost all black and white poplar, although there are a few isolated bluffs of heavy spruce, especially in the southerly parts of sections 35 and 36. There is not much open country, but quite a number of willow sloughs exist which always contain good soil. A few small creeks cross the north outline. The largest poplar, averaging ten to twelve inches, occurs in section 31.—*J. N. Wallace, D.L.S., 1906.*

Range 25.

5. This township is divided into three sections by Willowbunch lake, which extends nearly across the township from east to west, and which breaks up the township a good deal. This township is not easy of access as it is away from any of the leading trails except local trails. There is a good deal of hard soil in parts. Quite a number of

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 25—Continued.

sections are very good and would be adapted for grain-growing. The surface is entirely open, undulating prairie without any timber or scrub of any kind, and there are no hay lands or marshes. This will render it difficult for any settler to obtain any quantity of hay. There is very little water to be obtained in any part of the township—as the water in the lake is not suitable for use, being quite alkaline. There are a few ponds of good water in the northerly part of the township. There are no streams and consequently no mill sites. The climate indications are favourable and there are no indications of any summer frosts. Fuel is scarce, there being no timber of any size on any part of the township. Nor are there any indications of coal or lignite, and there are no stone quarries nor fixed rock of any kind. Game is scarce, almost unknown, owing to the want of shelter and water. Parts of the township would be available for settlement and ranching as there is in some places nice pasturage and grass in some of the low lands. On the whole the northern portion is better adapted for grain-growing.—*James Warren, D.L.S., 1905.*

11. The best way to reach this township is by a trail from Moosejaw. This trail is a very good one and easy to travel on as there are no bad hills or ravines on the route. The soil is generally clay, in some places very hard and gravelly. From the nature of the soil it would not be adapted to agriculture or farming, but would be more suitable for ranching as there are many ponds of good water distributed over the township and the pasturage is fairly good. The surface is hilly and rolling, in some places stony and rough. There is no timber of any kind on any part of the township, not even scrub. There are scarcely any hay lands, only in places there is some tall grass around the ponds. There are some nice ponds of good water and there is a lake partly in section 1 and one in sections 8, 9, 16 and 17, both of which are alkaline. There are no streams of water and consequently no water-powers. There is no fuel to be had in the township and fuel would have to be obtained from outside places as there are no indications of either coal or lignite. There are no indications of stone anywhere, nor are there any minerals to be found in the township. Game of all kinds is scarce, only a few ducks on some of the ponds. Taking the township as a whole it is better adapted for ranching than for any other purpose.—*James Warren, D.L.S., 1906.*

12. The route to this township is by trail from Moosejaw, which is a very good trail with no bad hills or soft places. The soil in this township is generally clay, which in places would be fairly well adapted for cultivation, and many settlers have taken up land and are settled on their homesteads. Some have very good crops where they have cultivated the land. The surface is general undulating prairie entirely free from timber of any kind, nor is there any timber near the township. There are some hay lands but of a very limited extent. There are some ponds which have good fresh water, but some of the ponds or lakes are alkaline. In sections 19 and 30 there are two good large lakes, but both are alkaline. The supply in these lakes appears to be permanent. There are no streams of any kind and consequently no water-powers. The climate appears to be good and not liable to summer frosts. There are no stones or minerals of any kind, nor does there appear to be any coal seams near the surface. Game is scarce, there being only a few ducks on the ponds. This township is fairly well adapted to farming, but on the whole, ranching would be preferable on account of the surroundings, though when the land is cultivated I have no doubt good crops will be obtained.—*James Warren, D.L.S., 1906.*

50. This township is situated about seven miles from Prince Albert, and is reached by the Candle lake trail, entering section 1 and leaving at section 24. The trail is very heavy and in poor condition. The soil is a fine, rich, black loam. The surface is entirely wooded, being covered with poplar, spruce, jackpine and willow. The

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Range 25—Continued.

poplar averages from two to eight inches. A belt of jackpine extends across the south of the township averaging from four to twelve inches. Spruce from four to twenty inches is found in small groves all over the township. Large hay sloughs are found in every portion of the township, particularly the southwest corner, the hay being of a second-class quality. The water is fresh. Garden river cuts across the northeast corner of the township entering on the north boundary of section 33 and leaving at the northeast corner of section 13. It is a stream of good water, fifty links wide, three feet deep, with a current of two miles per hour. This township, generally speaking, is under water, especially the south and west portion. This portion has no drainage and could only be drained at great cost. There is no water-power. The climate in summer has been mild. There was considerable rainfall in June and July. There have been no summer frosts up to the present time (29th August). There is an unlimited amount of fuel. No coal, stone or minerals are to be found here. Duck, deer and moose are plentiful.—*R. H. Montgomery, D.L.S., 1906.*

51. The northwest part of the township is broken by a lake which partly covers sections 31, 19, 29 and the whole of 30. The body of the lake is crescent-shaped with the discs towards the north. There are numerous small shallow lagoons surrounding the lake, from one to three feet in depth and from one to five acres in extent. They are connected with the lake by narrow channels. There is a very good hay meadow around the margin of the lake and reaching back a distance of from a half to three-quarters of a mile, on which there was cut this season about three hundred and fifty tons of hay. I am of the opinion that three thousand tons could be cut at this place, as the ground is dry, smooth, and free from hummocks and willow. Section 31 is partly broken by the lake. The balance is low, swampy, and timbered with balm of Gilead, poplar and willow. Section 32 is low, with willow bordering the sides of the dry creek bed leading from the lake into Garden river, through the southeast quarter of section 32 to the outlet on section 33. On section 28 there is a large hay meadow surrounding a long narrow slough. The hay meadow extends from the lake meadow through section 28 to near Garden river on section 27. The south half of section 28 is timbered with poplar two to five inches in diameter, and a few scattered spruce. There is a small bluff of spruce on section 29, the rest being covered with hay meadow and lake. Section 27 is all timbered with poplar. On the northwest quarter of section 21 there is a small hay meadow. The rest of the section is timbered with balm of Gilead and poplar from two to five inches in diameter, except the southeast part of the southeast quarter, which is open, the soil being black sandy loam throughout. Garden river is sixteen feet wide, from one to three feet deep, stony bed throughout its course, and its current is two miles per hour. It enters the township on the approximate location of section 33, turning in a southerly direction through section 33, northeast section 28 and southwest 27, then through the centre of sections 22, 13, 10 and 3. From section 22 extending along the stream, the land rises gently until there is an elevation varying from thirty to fifty feet above the river, continuing in undulating slopes on both sides of the stream to section 3. The high land on the west side of the river falls in a gently undulating slope until a level is reached at the west boundary of sections 16 and 8. There is a continuous open space from section 22 to south boundary of township, from half to three-quarters of a mile on each side of the river. This area was burned over several times during the past twenty years. The soil alternates from black sandy loam to heavy clay, with a sandy clay subsoil. Pea-vine, vetches and excellent ridge hay are in evidence everywhere on the open area. The river is at a low stage, and fordable at scores of places between the north and south boundaries of the township, with excellent approaches on both sides. The high land on the east side of the river between sections 22 and 23 drops almost imper-

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Range 25—Continued.

ceptibly towards the east boundary. There are open spaces, caused by fires some years ago, which are partly covered with willow and small poplar and hay meadows, from twenty-five to two hundred acres in extent, nicely distributed over the east half of the township. On section 25 there is a spruce bluff, about twenty acres in extent, of good building timber. There is another on section 35, of about thirty acres, suitable for building purposes. The soil alternates from black sandy loam to heavy blue clay. There is a good trail to the township, which was made some years ago from Prince Albert, through township 49, range 26, crossing Little Red river at section 22, running north to the southwest corner of township 50, continuing in a northeasterly direction to section 3, township 51, range 25, then through sections 3, 10, 15, 22 and 21 to the lake. There is also a trail branching off at section 22, fording over Garden river and continuing through sections 23 and 24; then in a northeasterly direction to Candle lake. The whole of this township is very suitable for mixed farming.—*A. L. Robertson, Forest-ranger, 1906.*

52. *North outline.*—The surface is undulating, the timber, a light growth of poplar, occurring not continuously but in patches. There is much partly open land with willow bushes and small poplar. Thick poplar occurs across the east half of section 36. The soil is generally good. There are many sloughs and hay meadows, especially on section 31. Garden river (formerly called Sucker creek) flows southerly across the township. It is fifteen feet wide where it crosses the north outline.—*J. N. Wallace, D.L.S., 1906.*

Range 26.

11. The route to this township is by trail from Moosejaw. This trail is a very good one, especially in the summer, there being no hills or any wet marshy places. The greater portion of the soil is hard clay, which is not suitable for agricultural purposes. Generally the township is better adapted for ranching than for farming, as the pasturage is fairly good, and there is plenty of water. The surface is open prairie, in many places quite hilly, and in some places quite rough. There is no timber of any kind in the township, being all quite bare. There are a few small hay marshes, but not of any extent. There are several ponds and three of them especially are large, lake Agnellice, lake Petallen and lake Freda. The water in these lakes is quite alkaline, but there is a very nice spring near the northwest angle of lake Agnellice, which is very good water. There are no streams of water in any part of the township. Fuel is entirely wanting; so much so that we had to bring our wood from Moosejaw. There are no indications of minerals, coal or stone. Game is also scarce, there being only a few ducks on the ponds or lakes. From the general features of the township it is better adapted for ranching than for any other purpose. There are no ranchers located on any part of the township, though there are many good locations as there are some ravines that would give good shelter.—*James Warren, D.L.S., 1906.*

12. The route to this township is by trail from Moosejaw. The trail is a very good one and generally level with no bad hills or marshes on the route. The greater part of the soil in this township is very hard and not in any way favourable for farming or agriculture. The land is better fitted for ranching purposes as the surface is entirely open prairie. There is no timber of any kind on any part of the township. There are some good hay lands, but of a limited extent. There are many ponds in the township, some of which are very good water, but some are quite alkaline. There are no streams of water on any part of the township and consequently no millsites or water-powers. Fuel is entirely wanting, we had to draw our wood from Moosejaw.

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Range 26—Continued.

Stone is abundant in some localities, but no quarries. There are no indications of coal in any exposure on the hills. Game is scarce, only a few ducks on the ponds being seen. There are two ranchers located on section 12 who have a very good outfit of horses and cattle, and a comfortable location.—*James Warren, D.L.S., 1906.*

51. This township lies by trail some fifteen miles north of Prince Albert. This trail follows the east bank of Little Red river and is not in good condition. The western portion of this township is covered by a light sandy loam, and the eastern half by a black loam about six inches deep with a clay subsoil. The western half along Little Red river is covered by a light poplar and willow scrub and the eastern half by poplar averaging from four to ten inches with a dense hazel underbrush. Spruce in sufficient quantity for building purposes for the settlers, will be found in sections 30, 29 and 35, averaging from four to twenty inches, but not in large quantities. Hay can be found in moderate quantities along Little Red river and around the lake which lies in the northeast corner, the shores of which are low and covered with hay. The quality is second class. All the water in this township is fresh and the supply permanent. Little Red river is a stream forty feet wide, six feet deep, with a current of two miles an hour. It enters on the west boundary of section 31 flowing south and east leaving on the south boundary of section 4. This river is used by lumber companies for driving logs. There is a lake on the southwest corner of this township, the east shore of which has a sandy beach while the west is low and marshy. There is no water-power available. The climate is mild. Dead wood can be found all over the township for fuel. There is no coal, stone or mineral to be found. Game is scarce. The provincial government is building a road due north from Prince Albert entering this township on the south boundary of section 4, making the distance to town ten miles.—*R. H. Montgomery, D.L.S., 1906.*

52. *North outline.*—This township is rolling and is generally timbered with poplar varying from two to twelve inches in diameter, with many small willow marshes. There are many small ponds and sloughs. Sections 33 and 34 are the most thickly timbered on the north outline.—*J. N. Wallace, D.L.S., 1906.*

Range 27.

7. The best route for reaching this township, distant about sixty miles southerly from Moosejaw, is by way of the trail from Moosejaw to Willowbunch. This trail is generally in good condition, though it is somewhat hilly in places. The soil is chiefly sandy clay or clay loam with a stiff clay subsoil in places and would be suitable for growing all the usual cereals and vegetables of the Northwest. The western and northern portions of this township are hilly and somewhat broken in places, but the eastern and southern portions are rolling. A small amount of scrub cherry trees in the bottoms of some deep coulées in sections 33 and 34 is the only scrub in this township. All the rest of the township is open prairie. There is no timber. Little or no hay could be cut in this township but practically the whole township is covered with a good quantity of upland grass suitable for grazing purposes. Water only slightly alkaline, can be procured in dry seasons in sections 25, 26, 28, 33 and 36. Elsewhere there is little or no water. A large spring of good water exists in the northwest quarter of section 28, but soon after leaving the spring it becomes impregnated with alkali. In the above-mentioned sections the supply of water is sufficient and permanent. A deep valley runs through portions of sections 6, 7, 8, 17, 18, 20, 28, 29 and 30. The lands in the bottom of this valley are liable to be flooded for a short time in the spring. No water-power could be generated in this township. During the early part of September when this township was subdivided, fine warm days and cool nights were experienced. There is no wood for fuel in this township. There exists a vein

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Range 27—Continued.

of black lignite in a valley in the northeast quarter of section 28, about ten chains in a southwesterly direction from the northeast corner of the section. The vein lies in a horizontal position, and the part that had been uncovered consisted of two veins, each about one foot thick and about six inches apart. This lignite burns freely when in large pieces, but on exposure to the atmosphere it quickly decrepitates and becomes a mass of 'slack.' A strong spring of good water comes out of this vein. In fact in this part of the district wherever coal or lignite occurs water also is to be found, and though the reverse has not been proved to be true in many cases where springs exist considerable quantities of lignite have been picked up. A considerable number of boulders and stones exists on the surface, but no stone in place was observed. No economically valuable minerals, with the exception of the above-mentioned lignite, were seen. Some antelope, a few prairie chicken, geese, ducks and rabbits were seen. *H. S. Holcroft, D.L.S., 1906.*

8. The trail from Moosejaw to Willowbunch passes through the westerly part of this township and forms the best way of getting to it. This trail is in good order but is somewhat hilly in places. The soil of this township is, generally speaking, clay. But clay loam and sandy clay appear in many places as a surface soil. In some places, particularly in the western range of sections, a layer of alkaline-impregnated earth exists at the depth of a few inches below the surface. This deposit varies in thickness from a few inches to two or three feet. Stones and gravel occur in a few places though not in large quantities. This township is well suited for grazing or general farming purposes. This township is open, rolling prairie, somewhat hilly in the eastern portion, sections 6 and 7 being the only portions that are nearly level. No timber is to be found upon this township. Hay marshes of varying size, averaging about twelve acres in area, are well distributed over the township. These marshes contain a luxuriant growth of wild hay. A good quantity of upland grass grows all over the township. There are no lakes or rivers in this township. A few sloughs occur in the northeastern portion of the township, but all the water is too alkaline for human consumption with the exception of a spring beside the Moosejaw and Willowbunch trail in the northwest quarter of section 32. This water is slightly alkaline also. It is called the 'Twenty-five-mile Spring,' being twenty-five miles northerly from Willowbunch. This spring is the only permanent drinkable water in the township. None of the land is liable to be flooded to any greater extent than is caused by the melting of the snow together with the spring rains. No water-powers occur in this township. During the first week in September, in which this township was subdivided, the weather was warm and dry with cool nights but no frosts. There is no fuel in this township, the nearest wood being about ten miles southerly in townships, 25, ranges 27 and 28, where there is some cottonwood and poplar. Lignite can be procured from a vein in township 7, range 27. No coal or lignite veins were seen in this township. No stone in place was seen in this township. No minerals of economic value were encountered. Ducks of different kinds, a few geese and some antelope were seen.—*H. S. Holcroft, D.L.S., 1906.*

52. North outline.—Sections 31, 32 and 33 are rolling with a light growth of small poplar and are good land. Section 34 is wet and swampy with tamarack. Sections 35 and 36 are dry and rolling and generally, but not heavily, timbered with poplar and willow. The land is nearly all good along this range.—*J. N. Wallace, D.L.S., 1906.*

Range 28.

7. The most accessible route to this township is from Moosejaw, about sixty miles northerly on the Canadian Pacific railway. The trail from Moosejaw to Willowbunch, which passes through section 36 of this township, is a good trail to travel on

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 28—Continued.

in dry weather, but is somewhat hilly for a considerable portion of its length. The soil is principally clay, varying from that to sandy clay and clay loam, and should be suitable for growing all the usual cereals and vegetables of the district. It is somewhat stony in the bottoms of the coulées. A long valley through which the Moosejaw and Willowbunch trail runs, extends along the whole length of the east outline and a 'bottom' runs along the north boundaries of sections 34, 33 and 31. Coulées run back from both sides of these 'bottoms' into the township to a distance varying from a half mile to one mile, and these make the eastern and northern portions somewhat broken. Elsewhere the township is mainly gently rolling open prairie. There is no timber in this township at all. A few scattered hay-meadows are located in this township, but very little hay can be cut. The bottom lands along the northern outline would furnish a lot of good hay if cut early in the year. A fresh water slough is to be found on the east boundary of section 13. A spring at the southeast corner of the township and a spring of only slightly alkaline water in the northwest quarter of section 35, form the only bodies of fresh water seen in this township. The north and south outlines are liable to be flooded to the depth of about two feet or so for a while in the springtime. This is the only land liable to floods. The supply of fresh water at present is permanent though hardly sufficient. No water-power can be generated. The climate is the usual climate of the district; hot days and cool nights. Summer frosts, I believe, do not often occur. During the month of September, when the township was being subdivided, the days were fine and warm and the nights moderately cool. No frost was experienced. There is no fuel in this country, but poplar can be procured in the township to the south. No coal or lignite veins were encountered. No rock in place was to be seen and no mineral of economic value. A considerable number of ducks, mostly gray, blue and green wing teal and spoonbills, were seen. A few antelope and geese were also seen. Prairie chickens and jack-rabbits were very scarce.—*H. S. Holcroft, D.L.S., 1906.*

81. This township is most easily reached by the trail from Moosejaw to Willowbunch, which passes through section 1. Moosejaw is distant about sixty-five miles northerly, and is the nearest railroad point. The Moosejaw-Willowbunch trail is in good condition, but some parts are hilly, which makes travelling difficult after rain. The soil of this township is generally a stiff clay, with patches of sandy clay and gravel. The western range of sections are nearly all of a heavy clay loam. All the soil is first class and should make good agricultural land. This township is entirely open, rolling or hilly prairie. A few hills, about sixty feet high, occur in sections 4, 5, 8, 9, 20 and 21. The remainder of the township is rolling. There is no timber at all upon this township. Small hay meadows containing a heavy growth of wild hay are to be found distributed well over the township. Lake of the Rivers, or, as it is locally called, 'River lake,' is the only permanent body of water in this township. This lake cuts off portions of sections 19, 30 and 31, but is too highly alkaline for human consumption. At present fresh water can be secured from a spring in the northeast quarter of section 35, township 7, range 28, but this supply is not sufficient. None of the land is liable to be flooded. Water-power could not be generated in this township. During the period of subdivision of this township, viz., the second week in September, the weather was warm during the day and cool at night, with a few light frosts and some rain. No fuel exists in this township. The nearest procurable wood is in township 6, in ranges 27, 28 and 29, where there is a quantity of small cottonwood and poplar. No coal or lignite deposits were seen. No stone in place nor any economically valuable minerals were seen. Considerable numbers of ducks of various species, a few antelope and jack-rabbits were the only variety of game seen.—*H. S. Holcroft, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 28—Continued.

9. The trail crossing township 11, range 28, is the best one for reaching the part of the township to the west of Lake of the Rivers. The trail running from Moosejaw to Willowbunch passes through the east part of the township. The soil is all clay, but very little is suitable for farming. The east halves of sections 29 and 32 and sections 28 and 33 are suitable for farming. The south halves of sections 2, 3 and 4 are suitable for farming. The remainder of the township is rolling and hilly, and more suitable for grazing. There is no timber in the township, but there is some scrub in coulées running back from the lake in sections 6 and 7. There are no sloughs suitable for hay, and the upland grass is short and not very thick on the ground. The water in Lake of the Rivers is slightly alkaline. There is a good fresh water slough on section 1. There is a fresh water spring in section 15, and also smaller springs along the lake shore in sections 23 and 35. There are no streams and no available water-power. Wood and coal for fuel can be procured at Willowbunch. There are no lignite or coal veins in the township. There are no stone quarries or minerals of economic value. Small game such as chickens, rabbits and foxes were quite plentiful to the west of the lake. There were large flocks of ducks, geese and pelican on the lake at the time of survey (October). No antelope were seen, but this was probably due to the fact that the grass had been burned by a prairie fire just previous to the time of survey.—*C. M. Teasdale, D.L.S., 1906.*

10. The trail from Moosejaw to Willowbunch runs through the part of the township to the east of Lake of the Rivers. The westerly part of the township is more easily reached from Wood mountain trail, in township 11, range 29. The soil to the east of the lake is mostly a sandy loam and, being very rolling, is best adapted to grazing. The soil to the west is a heavy clay, and though in most parts the country is rolling, it could be mostly brought under cultivation. There is a little willow scrub along the lake shore in sections 3, 9 and 16, but there is no timber. There is some good hay land around a slough in section 6. There are good springs near the lake shore in sections 33 and 16. There are also several springs on the east side of the lake in section 36. There are no fresh water sloughs and no creeks. There is no available water-power. We had some frosts during the survey of the township (September and October). There is a two-foot lignite vein in section 36, but it was impossible to tell what the quality of the coal was, as the surface was badly weathered out. There are no stone quarries or minerals of economic value. Small game is quite plentiful, especially in the rougher parts along the lake, there being chickens, rabbits and foxes. Geese, ducks and pelican are found in large flocks on the lake. Several large herds of antelope were seen during the survey.—*Chas. M. Teasdale, D.L.S., 1906.*

11. There is a good trail crossing the northeast of the township, which is the best way for reaching the easterly portion of the township. The portion of the township to the west and south of Lake of the Rivers is more easily reached from Wood mountain trail passing through township 11, range 29. The soil is largely clay, but in the more rolling parts and adjacent to the lake there is considerable gravel. The township as a whole is best adapted to grazing, although there are a few sections suitable for farming. There is no timber and only a few small bunches of willow scrub along the east shore of the lake. There are no natural hay lands. The water in the lake is slightly alkaline, but there are some good fresh water springs along the shore. There was no water in the sloughs at the time of survey (September). There are no streams and no available water-power. There were no indications of severe frosts at time of survey. Willowbunch is the nearest point where one can get coal and wood for fuel. There are no coal or lignite veins in the township. There are no stone quarries and no minerals of economic value are known. Game is very plentiful. Large flocks of geese, ducks and pelican are found on the lake, and foxes, coyotes, rabbits and badger are

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 28—Continued.

found in the hills around the lake. Several herds of antelope were seen in the township.—*Chas. M. Teasdale, D.L.S., 1906.*

52. *North outline.*—This range comprises only the fractional section 36. It extends on both sides of Little Red river. The surface is rolling and is about half prairie and half poplar and willow. Except for a small swamp area just east of Little Red river, the land is very good.—*J. N. Wallace, D.L.S., 1906.*

Range 29.

7. The trail from Moosejaw to Willowbunch passes about six miles to the eastward of this township and affords the easiest means of access to it. The Moosejaw and Willowbunch trail is a good trail but is somewhat hilly in places. The soil is clay or clay loam or sandy clay. It is somewhat light in places but should produce good crops of wheat and other cereals as well as all varieties of the vegetables of the province. Parts of sections 24, 25, 26, 35 and 36 are somewhat broken by coulées and hills. The remainder of the township is open rolling prairie. No timber at all exists. A few tons of wild hay could be cut in the southwestern portion of the township, but excellent grazing exists all over the township. A small creek bed in the north of sections 34, 35 and 36 collects and holds rain and snow water, but in the very dry season this water becomes alkaline and not fit for human consumption. A shallow lake in the southern portions of sections 1 and 2 contains water, which though alkaline may be used. Beyond some few hay-meadows which hold rain water for a short while, no water exists. The supply of water is not sufficient or permanent. No water-power could be generated. The climate is good. Summer frosts, I believe, are rare. There is no fuel in this township, but poplar may be procured in a large 'bottom' or valley about four miles southward in townships 6, ranges 29 and 30. No stone in place is to be found. No minerals of economic value were seen and no coal or lignite veins were seen. A fair number of ducks was seen, also some antelope and jack-rabbits. Coyotes, red foxes, and kit foxes were plentiful. Other game was scarce.—*H. S. Holcroft, D.L.S., 1906.*

8. The nearest railway station to this township is Moosejaw. The trail from Moosejaw to Willowbunch is at present the best route to follow in reaching this township. This trail must be left in section 1 of township 8, range 28, where a wagon road leaves the main trail and goes westerly through a valley which ends at the south of the Lake of the Rivers. This is a long narrow crooked lake with strongly alkaline water which occupies most of the two eastern ranges of sections. This trail is in good condition in dry weather, but would be heavy when wet. All this township except the part adjoining the lake has a clay loam with sandy loam and sandy clay in some places. This township is very suitable for agricultural purposes as the soil is good and the surface partly rolling. The land to the east adjoining the lake is broken by coulées which run back from the lake and the soil is rather stony and gravelly. About thirty squatters' shacks are set up in this township, mostly congregated about the centre. There is no timber or scrub in this township and only a very little hay could be cut. In the northern portion there are a few small hay-meadows on which grows a light crop of poor hay. Excellent upland grass for grazing purposes is to be had all over the township. There is no fresh water in the township, although in a valley in the southeastern portion there is a creek bed which collects the rain water, but this soon becomes alkaline. The water in the Lake of the Rivers is intensely alkaline. This lake is considerably lower than the rest of the township and is surrounded by high banks which are much broken by deep and long coulées. The lake is shallow and in many places contains a growth of rank grass. No water-power could be de-

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 29—Continued.

veloped. No coal or lignite veins are known to exist. Fuel in the shape of small poplar can be procured in township 6, range 29, about fifteen miles southerly. No stone in place exists. No minerals of economic value were seen. There are a few antelope, ducks and jack-rabbits. Prairie chickens are scarce. The small game is largely destroyed by the great number of hawks, coyotes and foxes which are found all over the township. An occasional sand-hill crane or a pelican may be seen.—*H. S. Holcroft, D.L.S., 1906.*

9. This township is most easily reached from trail in township 11, range 29. The soil is principally clay, and is mostly suitable for farming. Sections 35, 36, 25, 26 and 24 are hilly and best adapted to grazing. There is no timber or scrub. Large quantities of slough hay could be cut around the large slough in sections 26, 27, 33 and 34. Upland hay could be cut in the southwesterly part of the township, as the land is lighter and the grass much heavier than in the rest of the township. There is water in the slough in sections 33 and 34, and also in a small slough in section 26. There was no other water in the township at the time of survey (October). There are no streams and no available water-powers. There are no coal or lignite veins in the township, but there is both coal and wood at Wood mountain, in township 4, range 3, west of the third meridian. There are no stone quarries or minerals of economic value. There are a few antelope, chickens and ducks in the township.—*Chas. M. Teasdale, D.L.S., 1906.*

10. This township is reached from Moosejaw by the trail passing through township 11, range 29. The soil is mostly clay or clay loam, but is generally too rolling to make good farming lands. Sections 36, 7, 8, 9, 16, 17 and 18 are hilly and gravelly, and suitable only for grazing. The surface is all prairie, there being no scrub or timber. There is a large slough on sections 31 and 32, which was partly dry at time of survey (October), and would be good hay land. There is a smaller slough on section 3, parts of which could be cut for hay. Besides these there are numerous small sloughs all over the township suitable for hay. The upland hay is very short. There is fresh water in several sloughs. Besides the sloughs on sections 3, 31 and 32, there is water in sloughs in sections 7 and 8, and a good spring near the quarter-section on the north boundary of section 19. There are no streams and no available water-powers. Both coal and wood can be had at Wood mountain, in township 4, range 3, west of the third meridian, but there are no coal or lignite veins in the township. There are no stone quarries or minerals of economic value found in the township. Antelope, chickens and ducks are quite plentiful.—*Chas. M. Teasdale, D.L.S., 1906.*

11. The trail from Moosejaw to Wood mountain crosses the township in a southwesterly direction, entering in section 35 and leaving it in section 18. The northerly two tiers and the easterly tier of sections are inclined to be gravelly, but the remainder of the township is clay and clay loam. The northerly and easterly portions of the township are suitable only for grazing, while in the remainder there is some good farming lands. It is all open, rolling prairie, without any scrub or timber at all. There are no large hay meadows in the township, although there are a few small sloughs suitable for hay. Water is not plentiful, and at the time of survey (August) there was good water in a slough on section 23. There is a spring in section 27 on the trail. There are no permanent creeks, but in the spring there is water in the valley in sections 33, 34, 26 and 25, and in some places there is a distinct bed. There are no available water-powers. Vegetation showed no signs of frost at time of survey. Coal is mined at Wood mountain, and wood can also be obtained there. There are no coal or lignite veins known in the township. There are no stone quarries or economic minerals. Game is fairly plentiful. Several herds of antelope were seen during the survey. Chickens are quite plentiful in the rougher parts. There are large numbers of foxes and badgers.—*Chas. M. Teasdale, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 30.

6. *East outline.*—The trail from Wood mountain to Willowbunch crosses the east boundary of section 12 in this township and forms the easiest way to reach the township. The soil is mainly clay, being somewhat stony in places. It would probably grow good wheat and the usual cereals of the district. A large bottom, or valley, about one and one-half miles wide along which the Willowbunch and Wood mountain trail runs, enters the township on the east boundaries of sections 1 and 12 and passes southwesterly through the southerly portion of the township. This bottom is level and contains a large quantity of good hay. The soil here is a heavy clay. This valley contains a considerable amount of poplar up to three inches in diameter. The remainder of the township appears to be open rolling prairie, being somewhat rough in places and would make excellent grazing country. Several hay meadows are scattered throughout the township. The bottom mentioned above contains several good springs of fresh water, which are permanent and would give a good supply of water. This bottom is flooded in spring time for a while. No water-powers exist. During the month of September while this boundary was being run the climate was very mild, and only one light frost occurred. Fuel in the shape of poplar can be procured all along the Willowbunch valley in the southerly part of the township. No coal or lignite veins were seen. No bed rock was seen, and no economically valuable minerals were encountered. Antelope, ducks of various kinds, and geese were plentiful. A few prairie chicken and jack-rabbits were seen. Other game appeared to be scarce.—*H. S. Holcroft, D.L.S., 1906.*

7. The nearest trail to this township is the trail from Willowbunch to Wood mountain, which passes through township 6, in range 30. The greater part of the soil of this fractional township consists of a loam mixed with clay and sometimes with sand, and should be capable of producing good crops of all the usual cereals and vegetables of the province. The township is open rolling prairie with only a small quantity of good hay growing in some small hay marshes scattered throughout the township. Two hay marshes of considerable size are located on the east boundaries of sections 12 and 13 respectively. Water of a fair quality is found in a shallow marshy lake in the northeast portion of the township. This supply is sufficient and permanent. No water-powers exist here. The climate is the usual climate of the district—moderately equable. During the time this township was subdivided, viz., the first week in October, some frosts occurred, but the weather was pleasant. There is no fuel in this township, but fuel consisting of poplar, could be procured in a valley about four miles to the south. No veins of lignite or coal were seen. There is no rock in place and no economically valuable minerals were discovered. A good many ducks and geese were seen, also a few sand-hill cranes, swans and pelicans. Prairie chickens and jack-rabbits were scarce. An occasional antelope was seen; coyotes and foxes were plentiful.—*H. S. Holcroft, D.L.S., 1906.*

8. The trail from Moosejaw to Willowbunch passes twelve miles to the east of this township. In section 1, township 8, range 28, a well beaten trail leaves the Moosejaw and Willow bunch trail and goes westward to this township. These trails are good but parts of them are liable to be flooded in spring time. The soil is clay loam or sandy clay; it is a little light in places but should produce good crops of wheat and other cereals and all the usual vegetables of the Northwest. The surface of this fractional township is almost all level country. No timber at all is found. A small amount of hay could be cut from some small hay meadows in the northwestern portion of the township. At the time of the survey no water was found in the township. In spring time some of the depressions in the surface contain water, but during the dry season water cannot be found. None of the land is liable to be flooded except for a short time in the spring. No water-power could be developed. The

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TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 30—Continued.

climate is good, in summer time, hot days and cold nights. Summer frosts are rare. There is no fuel to be obtained in this township. Some small poplar can be procured in a valley about ten miles to the south. There are no coal or lignite veins and no bed rock. No minerals of economic value were seen. Some antelope and jack-rabbits were seen. Prairie chickens are very scarce on account of the great number of hawks that abound. Coyotes and foxes were numerous.—*H. S. Holcroft, D.L.S., 1906.*

9. This township is reached from Moosejaw by Wood mountain trail, which passes through township 11, range 30. The soil in the north part is a heavy clay, which turns to a clay loam in the south part. The portion north and west of sections 15, 23 and 25 is rolling and more suitable for grazing, while the part to the south is more level and suitable for farming. It is all open prairie without any timber. There are some sloughs in sections 9 and 10 suitable for hay. There is a clear fresh water lake on section 22. There are no streams or no available water-powers. Wood mountain, in township 4, range 3, is the nearest point at which wood and coal is obtainable at present. There are no stone quarries nor economic minerals in the township. Antelope are found in small herds which water at the lake. On the lake there are large numbers of ducks.—*Chas. M. Teasdale, D.L.S., 1906.*

10. This township is best reached by Wood mountain trail, which passes through township 11, range 30. The soil is mostly clay, but some lighter soil is found in section 36. The northerly halves of section 35 and section 36 are fairly level and should be good wheat land, but the remainder of the township is very rolling, and parts of sections 22, 23, 14 and 13 are hilly and inclined to be gravel instead of clay, especially on the ridges. This latter part would be more suitable for grazing than farming. There is no timber. There is one large hay meadow on section 35, which at time of survey (October) was perfectly dry. There is a large deep slough on section 12, and some small sloughs occur in sections 14 and 23. The water is all good, being practically free from alkali. There are no streams and no available water-powers. No severe frosts had occurred at the time of survey, as the grass on what had been burned in September was quite green. There is no coal or wood in the township, but both can be obtained at Wood mountain. There are no stone quarries or minerals of economic value. There are a few antelope, chickens and ducks in the township.—*Chas. M. Teasdale, D.L.S., 1906.*

11. There is a good trail running from Moosejaw to Wood mountain, which crosses the southerly portion of the township. The soil is a heavy clay, except in the northerly part of sections 35 and 36, where it is a light sandy loam. The clay soil should make good wheat growing land. The north part of the township is rolling prairie, but sections 11, 12, 1 and 2 are gently rolling prairie more suitable for farming. There is no timber in the township. There are no hay meadows. At the time of survey (September) there was no water at all in the township. There are no available water-powers. There were no indications of summer frosts. There are no coal or lignite veins in the township, but coal is mined at Wood mountain, in township 4, range 3, west of the third meridian. There are no stone quarries or minerals of economic value. Game is scarce, although at times there are a few antelope, and in the sandy portion at the north of the township there are some prairie chickens.—*Chas. M. Teasdale, D.L.S., 1906.*

14. The soil in this township is very hard and in many places stony and gravelly, and not well adapted to agriculture. There are some patches of hay land, but the hay is not very good.—*James Warren, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 1.

51. The northern fraction of this township lies some twenty-three miles from Prince Albert. It is reached by the surveyed road from Prince Albert to Sturgeon lake. This road enters the township on the south boundary of section 25 and leaves on the east boundary of section 36. Its condition is excellent. The soil is composed of clay, and in a few cases there is black loam from six to twelve inches overlying it. The southwest fraction has some rich black loam, and should prove excellent for farming of a mixed character. This township has been covered by a heavy growth of large poplar and spruce, averaging from six to twenty-four inches, but being in a timber berth the best has been taken away. What good timber is left would be difficult to obtain, owing to the rough character of the ground caused by the culls remaining. These could only be removed by bush fires. There are hay sloughs in sections 25 and 36. The quality is fair, but the quantity not extensive. Upland hay is to be found in sections 6 and 7. Water of fresh quality can be obtained in sufficient quantity in any part of the township. It is found in small creeks flowing into Sturgeon lake. This lake is an enlargement of the river of the same name. It is ten miles long and averages one-third of a mile in width. The north shore is very steep and heavily wooded. No water-power is available. The climate on the whole was mild, the first frost being on August 22nd. This township is covered by large windfall and dead wood, and fuel of this character will never be lacking. No coal or minerals were discovered. Stone and boulders were found. Game has been driven out. Whitefish and jackfish are plentiful in Sturgeon lake. The northern fraction of this township can scarcely become valuable as farming land unless the district becomes burnt over. In its present condition it is the most rough and rugged country imaginable.—*R. H. Montgomery, D.L.S., 1906.*

Range 2.

50. The northern part of this township can be reached by following the Shellbrook trail to the east boundary of this township; then going north and fording the Shell river. This trail is in good condition. The Shellbrook-Sturgeon lake trail passes through section 32. The soil is composed of black loam, six to twelve inches, with a clay or sand subsoil. It should prove a good mixed farming district. The land is lightly wooded generally with poplar, averaging from two to six inches in diameter. Sections 31 and 32 are covered by a light willow scrub. There is no timber. A little upland hay is to be found in section 36. Owing to the proximity of Shell river little surface water is found, and the land is never liable to be flooded. There are no waterfalls. The climate is mild, the first frost being noticed on August 22nd. Dead wood can be obtained in abundance for fuel. No coal, minerals or stones were found. Game was very scarce.—*R. H. Montgomery, D.L.S., 1906.*

51. This township lies on the main trail to the Prince Albert Lumber company camps at Stump lake. This trail follows the Prince-Albert-to-Sturgeon lake surveyed trail to the east end of Sturgeon lake. It then follows the south shore of the lake and river, and enters the township on the east boundary of section 12, a distance in all of about thirty miles, leaving the township on the north boundary of section 31. The condition of this trail is excellent. The soil is composed of a rich black loam, generally twelve inches deep, with a clay subsoil. The land should be suitable for mixed farming. The surface is generally covered with poplar and willow. Sections 1, 12, 14, 23, 15 and 16 are covered with very light poplar and willow scrub. In the southwest and northeast corners of this township spruce averaging from four to thirty inches is found in large quantities. A considerable amount of this timber has been cut out by lumber companies. There is a large quantity of both upland and lowland hay, the upland being found in the southeast corner and the slough hay on section 10 and around lake No. 1. Water is scarce except in Sturgeon lake and river. Sturgeon

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 2—Continued.

river, one chain wide, enters on the north boundary of section 31, flows southeast to section 21, thence east to Sturgeon lake. Particulars concerning this river could not be obtained at the time of the survey, as it was dammed by the Prince Albert Lumber company, and the whole river valley was in a flooded condition. The banks of this valley are about one hundred and forty feet high, and, as numerous coulées run into it, the land will never be flooded. Sturgeon lake begins in this township; it is merely an enlargement of the river. There are no waterfalls. The climate is mild. On August 22nd the first frost was noticed. Dead wood for fuel can be obtained in abundance all over the township. There is no coal or minerals. Colour of gold can be obtained in the creek beds. Boulders were plentiful along the river valley. Game is scarce, but Sturgeon lake is teeming with white and jackfish. Several squatters were found in this township. Their chief industry is supplying hay to the lumber companies—*R. H. Montgomery, D.L.S., 1906.*

Range 3.

21. This township is about 30 miles north of Mortlach, a small town on the main line of the C.P.R., and about 35 miles west of Craik, on a branch line of the C.P.R., from which the settlers obtain building material and supplies. There are well beaten trails from both these towns to various parts of the township. The soil throughout is sandy loam, with occasional clay suitable for wheat, oats, flax and potatoes. The surface is undulating to rolling throughout. There is no timber or scrub of any description in this township. There are four small alkali lakes in sections 2, 13, 14, 15, 22 and 21. There are also several small alkali creeks in the northern half of the township. Wells are dug by settlers usually at a depth of from 30 to 70 feet, but the water is not always drinkable, owing to a strong alkali flavour. There are a few small hay sloughs in this township. Settlers obtain good hay from Qu'Appelle valley, some 10 miles to the north. From information obtained, and my experience, there are no summer frosts; on the other hand, very hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, the settlers having to freight coal from Craik or Mortlach. No stone quarries were observed. A few antelopes and coyotes were seen. Our nearest postoffice was West Bridgford, situated in section 32, in the township to the north, to which the mail is brought from Craik once a week. A number of settlers were noticed building and ploughing, and from subsequent information I learned that all the homesteads were taken. Railway surveyors have laid out a trial line of the new extension line of the C.P.R. from Moosejaw to The Elbow, some six miles to the north of this township. As the settlers have generally only arrived on their homesteads this spring, the crop will not be very large, although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D.L.S., 1906.*

22. This township is about forty miles north of Mortlach, a small town on the main line of the Canadian Pacific railway, and about thirty-five miles west of Craik, on a branch line, from which the settlers obtain building material and supplies. There are well beaten trails from both these towns passing through various parts of the township. The soil throughout is sandy loam, with some clay and gravel, but on the whole is suitable for wheat, oats, flax and potatoes. The surface is undulating to rolling throughout. There is no timber or scrub of any description in this township. There is an alkali lake in sections 18 and 19, also alkali creeks in the northeast and northwest corners of the township. There is no other water. Wells are dug by settlers, and water is obtained usually at a depth of from thirty to seventy feet, but the water is not always drinkable owing to a strong alkali flavour. There are a few small hay sloughs in this township; settlers obtain good hay from Qu'Appelle valley, in the township to the north. From information obtained, and from my own experience,

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Range 3—Continued.

there are no summer frosts; on the other hand, very hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, the settlers having to freight fuel from Craik or Mortlach. Small poplar scrub is obtained for fuel from the sand hills some eight miles to the north. There are no stone quarries. A few antelopes and coyotes were seen. West Bridgford postoffice is in section 32 of this township; the mail is brought from Craik once a week. A number of settlers were noticed building and ploughing, and from subsequent information I learned that all the homesteads were taken. Railway surveyors have laid out a trail line of the new extension line of the Canadian Pacific railway from Moosejaw to The Elbow, through the northeastern portion of this township. As the settlers have mostly only arrived on their homesteads this spring, the crop will not be very large, although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D.L.S., 1906.*

23. This township is reached by several well beaten trails, running from the small towns on the nearest railways, distant forty to fifty miles. The soil for the southern three-quarters is sandy loam, the remainder almost pure sand. We noticed several crops of excellent wheat and oats, and undoubtedly the soil of the southern part compares favourably with that of the surrounding district, in which all kinds of grain and vegetables are grown. The surface of that portion south of Qu'Appelle valley is rolling and undulating, that to the north comprises sand hills. Qu'Appelle valley, about a mile in width, extends across the township from east to west, through which flows Qu'Appelle river, a small body of water which, at the time of survey (August), was dry in numerous places. There is a little green poplar and willow of small dimensions in scattered clumps throughout the sand hills, suitable for fencing purposes and firewood. In connection therewith, I may say it is from these sand hills that the settlers around this locality procure their firewood. Hay is procurable from the valley of the Qu'Appelle in sufficient quantities to provide for all necessary wants of the settler at present. There are no lakes or sloughs, but water is quite plentiful in places in Qu'Appelle river and in several creeks which flow into it. There is a beautiful spring of excellent water in section 3, which furnishes an abundant supply. There is no flooded land, except in Qu'Appelle valley. From experience and inquiry, I would say that there are no summer frosts likely to do any injury to crops. I did not notice any signs of lignite veins or coal in this township; the only fuel is obtainable from Sand hills. There are no stone quarries, but numerous boulders were observed on the hilltops and in the ravines. There are several trails in this township, the principal one being the old Temperance Colony trail running to Saskatoon. The nearest post office is West Bridgford, situated in section 32, township 22, range 3, and is about forty miles from Craik, from which town the mail is delivered once a week. The proposed route of the extension of the Canadian Pacific railway, from Moosejaw to The Elbow, runs through the southern part of the township. With the exception of a few antelope, we did not notice any game in this township. I understand that all the lands south of the river that were open for homesteading had been entered for.—*E. W. Hubbell, D.L.S., 1906.*

50. The northern half of this township lies about thirty miles from Prince Albert. It can be reached by a trail branching off from the main Shellbrook-to-Prince Albert trail. The condition of this trail is good. The soil is composed of heavy black loam with a clay subsoil and is suitable for all kinds of farming. The surface is entirely covered with poplar bush and poplar and willow scrub. Poplar averaging from two to fourteen inches suitable for building timber can be found all over the township. There is a large quantity of hay of a second rate quality to be found in sloughs. The shores of Succor and Vant creeks are covered with hay of an inferior

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 3—Continued.

quality. A large slough with hay of good quality is situated on sections 29 and 30. There will never be any scarcity of water in this township. There are two creeks Succor and Vant, both about fifteen feet wide and two feet deep with a current of two miles per hour. Succor creek enters on the north boundary of section 36 and leaves on the east boundary of section 24, while Vant creek enters on the west boundary of section 19 and leaves on the east boundary of section 24. There is no water-power available although lumber companies have made use of Succor creek to drive logs down. No coal, stone or minerals were found here. The climate is mild. On August 22nd there was a summer frost destroying potato vines. There is no scarcity of dry wood for fuel. Ducks are abundant in this township.—*R. H. Montgomery, D.L.S., 1906.*

Range 4.

10. There are trails running to this township from Moosejaw and Mortlach. The soil is a good clay suitable for general farming. The surface is level prairie without timber except along the creek banks. The timber is mostly maple and is very rough and suitable only for fuel and posts. There is considerable willow which would make posts. There are no sloughs, but there is an abundance of upland hay all over the township. There are no sloughs containing water. The water in Old Wives creek is free from alkali. At the time of survey (November) it was not running, but there was several feet of water in holes all along the creeks. The creek banks vary from fifteen to twenty-five feet high. Water-power might be obtained for part of the year as the creek is deep and swift during the spring and summer. The supply of wood along the creek is only small but coal can be had at Wood mountain in township 4. There are no lignite veins, stone quarries or minerals of economic value in the township. Prairie chicken and rabbits are very plentiful along the creek. As water is scarce and very hard to get even by digging, I think it would be a good plan not to allow any homesteader who has settled on the creek a pre-emption on it.—*Chas. M. Teasdale, D.L.S., 1906.*

21. This township is about thirty-five miles north of Mortlach, on the main line, and about the same distance west of Craik, on a branch line, of the Canadian Pacific railway. There are well beaten trails from both those towns. The soil throughout is sandy loam suitable for wheat, oats, flax and potatoes, but to insure a good crop considerable rain is necessary. The surface is undulating to rolling throughout. There is no timber or scrub of any description in this township. The only source of water supply in this township are the wells dug by settlers, usually at a depth of from thirty to seventy feet, but the water is not always drinkable owing to a strong alkali flavour. From information obtained and my experience, there are no summer frosts; on the other hand, very hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, the settlers having to freight fuel from Craik or Mortlach. No stone quarries were found. A few antelope and coyotes were seen. Our nearest postoffice was West Bridgford, situated in section 32, township 22, range 3, and to which the mail is brought from Craik once a week. A number of settlers were noticed, at the time of survey (June), building and ploughing, and from subsequent information I learned that all the homesteads were taken. Railway surveyors have laid out a trial line of the new extension line of the Canadian Pacific railway from Moosejaw to The Elbow, some eight miles to the east of this township. As the settlers have mostly only arrived on their homesteads this spring, the crop will not be very large although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 4—Continued.

22. This township is about 45 miles west of Craik (a small but thriving town, through which a branch of the C.P.R. runs), and is reached by a well beaten trail from that place. The soil throughout is sandy loam suitable for wheat, oats, flax and potatoes, but to insure a good crop considerable rain is necessary. The surface is open and undulating throughout. There is no timber or scrub of any description in this township. Good water is scarce; there are several alkali sloughs, also two small alkali creeks, one in the northwest part, the other in the eastern part of the township. Wells are dug by the settlers, and water is generally obtained at a depth of 30 to 60 feet, but it is not always drinkable owing to it having a strong alkali taste. There is no flooded land in this township. Some of the settlers obtain good hay from Qu'Appelle valley, distant about 10 miles. From information obtained, and my experience, there are no summer frosts; on the other hand, very hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, nor stone quarries. The settlers have to freight fuel from Craik or from Mortlach, situated on the main line of the C.P.R., and about forty-five miles distant. Small poplar scrub can be obtained for fuel from the sand hills some ten miles to the north. Our nearest postoffice was West Bridgford, situated in section 32, township 22, range 3, and to which the mail is brought from Craik once a week. A number of settlers were noticed at the time of survey building and ploughing, and from subsequent information I learned that all the homesteads were taken. Railway surveyors have laid out a trial line of the new extension of the C.P.R. from Moosejaw to The Elbow, some four miles to the east of this township. As the settlers have mostly only arrived on their homesteads this spring, the crop will not be very large, although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D.L.S., 1906.*

Range 5.

21. This township is about fifty miles west of Craik, a small but thriving town, through which a branch of the Canadian Pacific railway runs, and is reached by a well beaten trail from that place. The soil throughout is sandy loam, suitable for wheat, oats and potatoes, but to insure a good crop considerable rain is necessary. The surface is undulating to rolling throughout. There is no timber or scrub of any description in this township. There are a few hay sloughs, but these were dry and there were no other signs of water, other than wells dug by settlers, in this township. Water is obtained at a depth of thirty to sixty feet, but it is not always drinkable owing to a strong alkaline taste. From information obtained and my experience, there are no summer frosts; but on the other hand, very hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, nor stone quarries, the settlers having to freight fuel from the nearest station, which is Chaplin, situated on the main line of the Canadian Pacific railway, and about thirty-five miles distant. The only game is a few antelope in the southern part of the township. Our nearest postoffice was Log Valley, situated in section 34, township 20, range 8, and to which the mail is brought a distance of thirty-five miles from Herbert, on the main line of the Canadian Pacific railway, once a week. A number of settlers were noticed at time of survey, building and ploughing, and from subsequent information I learned that all the homesteads were taken. The lack of water is the great drawback of this section of the country. As the settlers have only arrived on their homesteads this spring, the crop will not be very large, although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D.L.S., 1906.*

22. This township is about fifty miles west of Craik (a small but thriving town through which a branch of the C.P.R. runs), and is reached by a well beaten trail

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Range 5—Continued.

from that place. The soil throughout is sandy loam, suitable for wheat, oats and potatoes, but to insure a good crop considerable rain is necessary. The surface is generally undulating throughout. There is no timber or scrub of any description in this township. There are a few sloughs, but these were dry and there were no other signs of water other than wells dug by settlers in this township. Water is generally obtained at a depth of 30 to 60 feet, but it is not always drinkable owing to a strong alkali taste. From information obtained and my experience, there are no summer frosts; but, on the other hand, hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, nor stone quarries, the settlers having to freight fuel either from Chaplin, situated on the main line of the C.P.R., and about forty-five miles distant, or from Craik. A few antelope and coyotes were seen. The original survey of this township was fairly well done. Iron bars minus the tins were found at nearly all the section corners, these of course being practically useless to the settlers, or land seeker. Stamped numbers on the few tins that were found have long since become unrecognizable. As a result, people hunting up their sections had great difficulty in ascertaining their locations. Our nearest postoffice was West Bridgford, in section 32, township 22, range 3; letters are obtained from there and Log Valley in section 34, township 20, range 8. A number of settlers were noticed at the time of survey, building and ploughing, and from subsequent information I learned that all the homesteads were taken. The lack of water and fuel is the great drawback in this section of the country. There is also difficulty in obtaining hay in the near vicinity. As the settlers have only arrived on their homesteads this spring, the crop will not be very large, although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D L.S., 1906.*

Range 6.

21. This township is about sixty miles west of Craik, and is reached by a well beaten trail from that place. The soil throughout is sandy loam suitable for wheat, oats and potatoes, but to insure a good crop, considerable rain is necessary. The surface is undulating to rolling, except the southern part which is rough and hilly, being on Vermilion hills. A valley about half a mile wide, with alkali bottom, runs across the southern part of this township in a southeasterly direction. There is no timber or scrub of any description on this township and the only noticeable sloughs situated in sections 16, 17 and 18 were dry. These sloughs doubtless furnish the settlers with most of their hay. Water is very scarce, in fact the only supply, except an occasional well, is from two springs situated in the southwest quarter of section 2 and the northwest quarter of section 18. The supply, though not large, is excellent. Wells are dug by the settlers and water is generally obtained at a depth of from 30 to 60 feet, but not always drinkable, it having a strong alkali taste. There is no flooded land in this township. From information obtained and my experience, there are no summer frosts, on the other hand very hot weather generally prevails during the summer months. We did not perceive any signs of coal or veins of lignite in this township, nor stone quarries, the settlers having to freight fuel from the nearest station, which is Chaplin, situated on the main line of the C.P.R. and about 35 miles distant. Stone outcropping and boulders were generally noticeable along the tops of ridges, in the valleys and on the hilltops. The only game is a few antelope in the southern part of the township. Our postoffice was Log Valley, situated in section 34, township 20, range 8, and to which the mail is brought a distance of thirty-five miles from Herbert, on the main line of the C.P.R., once a week. A number of settlers were noticed at time of survey, building and ploughing, and from subsequent information I learned that all the homesteads were taken. The lack of water and

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Range 6—Continued.

fuel is the great drawback of this section of the country. As the settlers have only arrived on their homesteads this spring, the crop will not be very large, although considerable land is broken and will be ready for next spring.—*E. W. Hubbell, D.L.S., 1906.*

Range 7.

21. We reached this township, distant about 65 miles, via a well beaten trail direct from Craik, a small but thriving town on the Qu'Appelle branch of the Canadian Pacific railway. The soil throughout this vicinity is sandy loam, with occasional gravel, suitable for wheat, oats and potatoes, but, owing to its nature, considerable rain is necessary to guarantee a first-class crop. The surface of the northern and eastern portions of this township is undulating and rolling; the southern, hilly and broken, constituting a portion of Vermilion hills. The western part of the township is broken and hilly, caused by the huge ravines and gullies which extend into the South Saskatchewan, of which a portion flows through this township. There is no timber of any description, except a few clumps of small green poplar in the ravines which adjoin the river, and in the hills, but it is practically valueless, being too small for fencing purposes or firewood. Consequently, fuel is very scarce, and in the course of a few years will be the burning question. There being no sloughs or swamps of importance, hay is at a premium. The most of it is procured by the settlers from other localities, or cut in the bottom lands and ravines, the latter being of poor quality. Water is very scarce, the only supply being the river and two or three small creeks, most of the latter having a strong taste of alkali. Wells are dug by the settlers, and water is generally obtained at a depth of twenty to forty feet, but not always palatable. There is considerable alkali in this section of the country, which affects most of the water more or less. There is no flooded land in this township, and the only water-power is the ever reliable Saskatchewan river, upon which many reports have already been made by experts and surveyors for the government's information, and to these I can add nothing of any value. My knowledge and experience of the climate is that there are no summer frosts; on the other hand, the heat is terrific, and with such little rain as we have had this year, the tendency will be towards a lighter crop than usual. With too much heat and little rain wheat will not mature to advantage. I did not notice any signs of coal or veins of lignite in this township. As before mentioned, there is practically no fuel, coal having to be brought from Chaplin, the nearest railway station, about thirty-five miles distant. There are no stone quarries, but on the summit of Vermilion hills boulders are quite numerous. We did not observe any traces of minerals. A few antelope and small deer were occasionally seen, but the rapid rush of settlers to this district is gradually diminishing their numbers and driving them away. In a few years, like the buffaloes, they will be a thing of the past unless stringent methods are adopted to prevent their extermination. The old well beaten trail from Swift Current to Prince Albert runs through this township. Our nearest postoffice was Log Valley, situated in section 34, township 20, range 8, an almost inaccessible place, and to which the mail is brought from Herbert, on the main line of the Canadian Pacific railway once a week. Messrs. Hitchcock & Ferguson, ranchers, have leased and fenced sections 1, 12, 2, 11, 3 and 10 and the east half of sections 4 and 9. They have about 300 head of horses, also a number of cattle. All the land of any value open for homesteads has been taken, and the new settlers are hard at work ploughing and building, and appear satisfied with their selection and prospects.—*E. W. Hubbell, D.L.S., 1906.*

Range 8.

21. This township is approached by several fairly good trails from the north and west, but as yet it is very little settled upon. The soil is generally sandy loam, but

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Range 8—Continued.

close to the river it is sand and gravel. A few fields of wheat were noticed, but they were not of the best quality. I should say the soil would be suitable for vegetables, etc. With the exception of that part of the township which adjoins the South Saskatchewan, the surface is rolling and undulating; the portion adjoining the river, with an average width of one mile, is rough, hilly and broken with numerous ravines, etc. There is a little poplar, willow and ash along the river banks and in the ravines; some of the ash and poplar in sections 24 and 25 is suitable for building purposes. Hay is scarce, only a small amount being obtainable from the few dry hay sloughs scattered over the township. A rancher who is located in section 25 feeds, as a rule, wool top to his stock, and they seem to prefer it to the slough grasses. There are no lakes or sloughs in the township. Water is procurable from the river and from a few creeks which in hot weather are almost dry. There is no flooded land, except when the Saskatchewan overflows its banks. From observation and inquiry, I should say there are no summer frosts. I did not notice any signs of lignite veins or coal in this township, nor are there any stone quarries. The nearest postoffice is Log Valley, situated in section 34, township 20, range 8, across the river, which makes the transport of mail difficult. The nearest town is Herbert, a small town on the main line of the Canadian Pacific railway, distant forty miles to the south. Should one not care, however, to risk swimming their horses across the river, it is necessary to travel around by The Elbow, thus involving an extra journey of sixty miles. A ferry in this vicinity would be a great boon to the settlers. With the exception of a few jumping deer, we did not notice any game in this township. Several lines of the original survey had to be entirely resurveyed, as many of the mounds were obliterated, this being caused by the nature of the soil causing the banks to cave in. The southern and eastern parts of this township being so rough and broken, it will never be of use for cultivation, but nevertheless forms an ideal ranching country.—*E. W. Hubbell, D.L.S., 1906.*

22. In order to reach this township, we had to travel around by The Elbow and then cross the river by the ferry. From this point a fairly good trail leads to the township, although in places it is difficult to follow as, for some eight miles, it passes through sand hills. The soil throughout is sandy loam, suitable for growing wheat, barley, oats and vegetables, but, owing to its nature, considerable moisture is necessary to guarantee a first-class crop. The surface is open and rolling, but hilly in the northern and western portions, also broken and hilly in the eastern portion, the latter being caused by the huge ravines and gullies which extend into the South Saskatchewan, which flows in a northerly direction through this township. There is no timber of any description, except some poplar and ash in the ravines which adjoin the river. There is also a small quantity of timber on the banks of the river in sections 13, 24 and 25; some of it is suitable for building purposes, but it is being used up rapidly by settlers on adjacent lands. There are a few hay sloughs situated in sections 7, 9, 18 and 20, from which the settlers procure hay for the winter. Besides the river and Sandy lake, there are a few springs in the ravines which run into the river, an especially good one being in sections 12 and 13. Regarding the climate, to the best of my knowledge and belief there are no summer frosts. We did not notice any signs of coal or lignite veins in the neighbourhood of this township. The nearest railway station is Herbert, situated on the main line of the Canadian Pacific railway about forty miles to the south, but in order to reach it one has to cross the river at The Elbow, necessitating a journey of eighty miles or thereabouts. The nearest postoffice is Log Valley, situated in section 24, township 20, range 8, on the other side of the river. There are no stone quarries, but boulders are seen occasionally on the hilltops. We did not observe any traces of minerals. A few antelope and jumping deer were seen, also coyotes and foxes and a few prairie chicken. A few settlers' and hay trails run

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Range 8—Continued.

through this township, and at the time of survey (July) there were only three or four settlers' houses. However, I believe most, if not all, of the lands open for homesteads are entered for.—*E. W. Hubbell, D.L.S., 1906.*

Ranges 11 and 12.

9 and 10. *East boundaries.*—These townships are all open prairie; for the most part the surface is rolling, but in some places it is quite level. The soil is chiefly clay or sandy loam, with clay subsoil. Most of the land coming under my observation could be rated only as third class, but it is fairly good for general farming or for grazing purposes. The absence of timber and of any apparent source of easily accessible fuel presents serious obstacles to settlement. No building stone or mineral of economic value was observed.—*Geo. Edwards, D.L.S., 1906.*

Range 11.

11. This township is accessible by a good trail from Swiftcurrent. The soil is chiefly clay, with varying proportions of sand or sandy loam, and is suitable for general farming. The surface is generally rolling prairie with no timber whatever. There are no hay areas of any considerable extent. There is one small creek traversing sections 35 and 25, but not with a permanent flow of water. Russell creek crosses the southern part of the township from west to east. The upper part of the creek appears to be fed by springs which afford a continuous supply of excellent water. The water at time of survey had no current farther than section 9, where it was entirely absorbed, and only stagnant pools along the bed of the stream marked its course. Climate is good, summer frosts are evidently unusual, but the average rainfall appears to be light. There is no fuel supply within the township. There are no stone quarries, and no minerals of economic value. Antelope were seen occasionally. A few ducks were the only other kind of game observed.—*Geo. Edwards, D.L.S., 1906.*

12. This township is reached by a good trail from Swiftcurrent. The soil is almost uniformly clay throughout, about two-thirds of the area being well adapted for general farming; the remainder is too rough for cultivation, but suitable for grazing. The surface is entirely open prairie with no timber whatever. There are no hay areas of any considerable extent. The water supply is scant. One creek traverses the township, but it was partially dried up at time of survey and could not be depended on as a permanent source of supply. Climatic conditions are favourable. No summer frosts were observed. The average rainfall seems to be light. There is no fuel supply within the boundaries of the township. There are no stone quarries, and no minerals of economic value. Antelope were seen frequently. No other kinds of game were observed.—*Geo. Edwards, D.L.S., 1906.*

Range 19.

29. The route for reaching this township is along the surveyed trail from Swiftcurrent towards Battleford, and thence westerly to the township. The trail is in good condition. If approaching from the north along the surveyed trail the best route would be to leave it where it crosses Eagle creek, and follow the old cart trail running southwesterly which enters the township in section 36, and crossing the township leaves it in section 18. The soil is generally six to eight inches of black loam on a clay subsoil. The township is suitable for grazing. Sections 1 to 6 are stony, but the remainder of the township is suitable for farming as far as the soil is concerned. The whole of this township is open prairie. There is no timber. There are a few hay marshes, one of considerable size in sections 16 and 21, and another in sections 25

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 19—Continued.

and 36. The hay from these would be of good quality. The supply of water is limited. Strawberry lake enters the township in sections 4 and 5 and affords a permanent supply of fairly good water, but the remainder of the township would have to depend on the water in the large hay marshes before mentioned. The land is not liable to be flooded. There are no water-powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal or lignite veins were found. There were no stone quarries or minerals of any kind found in this township. A good many antelope were seen, also ducks.—*Herbert J. Bowman, D.L.S., 1904.*

30. The route for reaching this township is along the surveyed trail from Swift-current towards Battleford, and thence westerly to this township. The trail is in good condition. The whole of this township is open prairie. There is no timber. The growth of grass is sparse, there are very few hay marshes in the township, but there is a large one in sections 20 and 29 and another in section 7, and smaller ones in sections 10 and 16. The hay from the marshes would be good. Water is scarce in this township, but there is a permanent pond in section 4, also a number of sloughs along the north boundary with fresh water. The land is not liable to be flooded. There are no water-powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal or lignite veins were found. There were no stone quarries or minerals of any kind found in this township. A few antelope and ducks were seen.—*Herbert J. Bowman, D.L.S., 1904.*

31. The route for reaching this township would be along the surveyed trail from Swiftcurrent towards Battleford, leaving it about opposite the centre of township 30, range 17, and thence northwesterly across township 30, range 18. The trail is good, but light loads would have to be taken across the hilly country after leaving the trail. The whole of the township is clay. The land would be suitable for grazing, and also for farming, as it is thought that when the soil is tilled it would tend to increase the rainfall. The whole of the township is open prairie. There is no timber. The growth of grass on this heavy clay land is sparse and hay marshes are not numerous, but there are a few in the southerly half of the township, viz., in sections 3, 4, 5, 10, 12, 15 and 16. The hay from the marshes would be good. Water is scarce in this township but may be obtained in sloughs, and marshes along the south and east boundaries except after a succession of dry seasons. The land is not liable to be flooded. There are no water-powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is no supply of fuel in this township. No coal or lignite veins were found. There were no stone quarries or minerals of any kind found in this township. Game is scarce.—*Herbert J. Bowman, D.L.S., 1904.*

Range 27

21. The route by which we arrived at the township was a trail running northerly from Maple Creek. In the summer this is a good trail but in the early part of the season there are some places that are difficult to travel through. This township taken as a whole is a fairly good township, there being a great deal of very good land in it, chiefly clay and clay loam. The surface is all open prairie quite destitute of timber, as are also the townships in this district. There are no hay lands or meadows, as the township is very dry. Water is very scarce, there being no ponds or sloughs nor are there any streams. The lack of water would be a drawback to settlers, but I think water can be got by digging wells. The climate appears to be good. There are no

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 27—Continued.

indications of any summer frosts. Fuel of all kinds is entirely wanting, there being no timber of any kind, and no indications of coal in any part of the township. In fact there are no indications of any minerals or stone to be seen anywhere in the township. Game is entirely wanting, as there are no ponds for ducks or wild geese. Taking the township as a whole, a great part of it is available for agricultural purposes for growing wheat, oats and roots.—*Jas. Warren, D.L.S., 1906.*

22. The route by which we arrived at this township was a trail running northerly from Maple Creek. This is a good trail except in spring, at which time there are places difficult to cross. The southerly portion of this township is very good land. The northerly part is not so good, being in many places very sandy, with sand hills and small scrub. The southerly portion would be well adapted for general farming, wheat and root growing, as the soil is quite loamy and good. The surface is open prairie and in places rolling. There is no timber on any part of the township, only a few small clumps of poplar in the northerly part. There are no hay lands. Water is scarce, there being no sloughs or ponds, but from the appearance of the land water could be got by digging. Fuel is entirely wanting, there being no timber and no signs of coal or lignite. There are no quarries, nor are there any loose stones that could be used for building purposes. There are no indications of any minerals of any kind. Game is scarce, as none was seen by us during the survey. Taking the township as a whole, the southerly portion would be well adapted for general farming, as the situation and general lay of the land is quite favourable for such.—*James Warren, D.L.S., 1906.*

Range 28.

21. This township was reached by a trail running northerly from Maple Creek. This is a fairly good trail, especially in the summer season, though early in the spring parts of the trail were very bad and difficult to travel over. This township had fairly good soil in the greater part, though part of the southerly portion is sandy. With this exception the township has a great deal of good land in it, and would be well adapted for wheat and grain growing. The surface is all open prairie, with the exception of a few scrub bushes in some portions. There are no hay lands in any part of the township. Water is very scarce, and where found contains a great deal of alkali in it, rendering it almost unfit for use. There are no streams in any part of the township, and, of course, no waterfalls or mill sites. The climate is good, and there are no indications of summer frosts. There is no fuel available in any part of the township, except a few poplar bluffs in the southwesterly part. There is no coal or lignite to be found in the township, nor are there any stone quarries, and very few loose stone. There are no indications of minerals of any kind. Game is almost unknown; there are no ducks or antelope. Taking the township as a whole, it is better adapted for agricultural purposes than for ranching.—*Jas. Warren, D.L.S., 1906.*

22. The route by which we arrived at this township was by a trail running northerly from Maple Creek, which, except in a few places, we found very good, the very wet season having made some parts heavy for travelling. The northerly portion of the township is badly broken up by ravines running toward Saskatchewan river. The southern portion is open and undulating prairie, there being no timber of any kind in the township. There are no hay lands and no marshes or sloughs. Water is scarce, there being no streams of any kind. The nearest permanent supply is at the river to the north. There is no fuel in the township, but a little timber can be got in the valley of the river. There are no indications of coal or lignite, nor any stone quarries or minerals of any kind. Game is also scarce, only a few ducks along the river. The southern part of the township would be fairly well adapted for agriculture, but the northerly portion is not available for such but could be used only for grazing along with the adjoining lands.—*James Warren, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 29.

2. I left Medicine Hat on June 21, passing through Cypress hills via the Lodge police post and thence down Lodge creek to the work. The trails at this time of the year were in rather poor condition owing to the heavy rainfall during the end of May and early part of June. There is also a trail from Maple Creek to this township, and the distance is somewhat less than from Medicine Hat, but is reported to be much rougher. Many settlers coming to this locality come via Havre, a station on the Great Northern railway and distant some forty miles from this township, and the trail is said to be fairly good. The soil on the uplands is clay, clay and sand, and clay mixed with stones, and does not appear to be adapted to farming on account of the small rainfall. The soil in the valleys is sandy or clay loam and when irrigated yields most luxuriant crops. I am informed of, and indeed some of the small garden patches that came under my observation showed, the beneficial effects of irrigation producing all kinds of garden vegetables, and a few small fields of oats and hay. The uplands, however, appear to be well adapted for stock grazing purposes, as the herds seen in this locality all bore testimony to the excellent quality of the feed. The surface of the township is gently rolling prairie broken by the valleys of Lodge and Middle creeks. There is no timber in this township, but along the creeks one finds an occasional clump of willow brush. There is no land that could be properly called hay lands, except a very small amount in the valleys, and even here the crop is exceedingly short, although cut by ranchers in place of better. The township is well watered by Middle and Lodge creeks, that flow through it in a southerly direction. These creeks, as is characteristic of prairie streams, rise and fall with great rapidity. When I first reached Middle creek the water was from two and one-half to six feet deep, with a current of four miles per hour, a week later it had fallen to from one to three feet with a current of two and one-half to three miles per hour, and I was credibly informed that both this creek and Lodge Creek ceased to run in August and September. There was always water enough, however, for watering stock. The valley is liable to be flooded to a depth of from one to three feet almost any spring or early summer. Owing to the extreme fluctuations in the volume of water, I do not think these streams would be suitable for developing power of any kind, but the settlers along them are all engaged in putting in irrigation systems on a small scale, and I have no doubt will very greatly increase the value of these bottom lands. After June, there is very little rainfall, usually bright weather but subject to violent winds, indeed there are but few days that are not windy and during July and the end of June much haze and smoke seemed to be in the air, which rendered daylight observing somewhat difficult. For fuel both wood and coal are in use. The wood may be obtained in Cypress hills, consisting of spruce and poplar, but is very rapidly disappearing. Coal is the chief fuel and is at present obtained about ten miles south of this township in the state of Montana, where settlers go and dig it for themselves. It is of the bituminous variety, is largely mixed with shale and other detrital matter and contains considerable sulphur. No veins of coal were seen in this township. No stone quarries were observed. No minerals of economic value were found. Jack-rabbits, chickens, a few ducks, antelope, kit foxes, coyotes, were comparatively numerous, and badgers abound everywhere, but antelope are being rapidly driven back by the advancing settlements. There are three settlers in this township who are all located on Middle creek. All have small herds of cattle from two hundred and fifty to three hundred and fifty each, and each of them is working on an irrigation scheme by means of which he hopes to be able to raise at least all the hay required to winter his herd, and which if successful will tend to increase the value of their holdings very materially. There were other locations along those creeks open at the time of my visit which I have no doubt might be as successfully irrigated as those mentioned and would make this township of some considerable value.—A. H. Hawkins, D.L.S., 1906.

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 7.

59. The township is somewhat difficult of access owing to the valley which runs from the northwest corner to the southeast corner and is on an average of 300 feet deep. There is a trail from Keheewin Indian reserve to Moose lake, which crosses the northeast corner of this township and a surveyor's trail which is very rough crossing the township from the southwest corner to the first named trail. The township is fairly heavily timbered with poplar, birch and spruce up to 14 inches diameter, but there is not sufficient timber nor is it of large enough size to warrant a timber reserve. An excellent stream runs from Keheewin lake in the southeast corner to Bangs lake in the northwest corner and there are also a few smaller tributary creeks. The feed along the eastern slope of the valley is excellent and slough hay can be cut in the valley bottom, otherwise there is little feed of any sort. The soil is good, averaging 6 inches black loam and clay subsoil. Moose, caribou and deer are to be found, also fur-bearing animals as bear, mink, coyotes, etc. There are fish in Keheewin lake and Longlake creek but no whitefish. No minerals were observed.—*M. W. Hopkins, D.L.S., 1906.*

60. Two excellent trails cross this township, one from Keheewin Indian reserve and the other from Fort Pitt and Onion lake, both joining in section 16 and leading to Cold lake. The township is well supplied with water, by lakes and creeks. Hay is fairly plentiful. The soil is an average of six inches black loam with a clay subsoil. Around Moose lake the soil is sandy. There is ample timber in the township for building and fuel purposes, including poplar, spruce and jackpine. A large part of the township especially in the centre has been burnt, leaving large patches of brulé standing and fallen. The country is well hunted by Moose Lake Indian reserve Indians and game is not plentiful. Moose lake is well stocked with whitefish and there are fish in Bangs lake.—*M. W. Hopkins, D.L.S., 1906.*

Range 8.

59. Two trails cross this township, the one a well beaten trail from St. Paul to Moose lake and Cold lake, the other an old trail (not well travelled) from Fort Pitt to Lac LaBiche. There are many lakes all containing good water. Also two good creeks, one running through sections 26, 27, 34 and 35, the other through sections 6, 5 and 4; the former is fed by springs and probably never dries up, the latter at time of survey had only a few pools of water. The soil is good, averaging six inches black loam and clay subsoil. The township is somewhat stony in parts, especially on Chickenhill in sections 33 and 34. Timber for fuel is fairly plentiful, especially in the eastern half of the township. Good upland and slough hay can be cut. Moose, caribou, bear and other fur-bearing animals are found. Fish are found in Chickenhill lake, but not whitefish.—*M. W. Hopkins, D.L.S., 1906.*

60. The whole township is well adapted to farming; as the land is level and undulating with the exception of sections 1, 2, 11, 12, 14 and 13, which are broken by small ravines in places, but are still first-class farming lands. There is fair timber in the south of the township, spruce, poplar and some ridges of jackpine, but the northern part of the township is only lightly timbered with poplar and willow brush. An excellent creek, Yelling creek, runs from west to east clear across the township and joins the larger Longlake creek in section 12. Yelling creek has its source in a spring in township 60, range 10, and is said never to run dry. There are not many sloughs and only one lake in section 25. The soil varies from two inches to six or nine inches of black loam throughout the township; all the subsoil is clay. Moose lake trail, which is a well travelled trail, crosses the southeast corner of the township and wagons can traverse most of the township with little difficulty. There seemed to be rather a scarcity of game, but the trails and tracks show that at times game com-

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 8—Continued.

prising bear, moose, caribou and deer are fairly plentiful. No fish were observed. No traces of gold, &c., were observed, nor coal nor lignite.—*M. W. Hopkins, D.L.S., 1906.*

Range 9.

59. The whole township is of excellent farming character and is well supplied with timber, water and hay. The soil is of a rich black loam from two to twelve inches in depth with clay subsoil. The township is well supplied with water by lakes, sloughs and creeks. Vincent lake is surrounded by timber suitable for fuel or building purposes, with the exception of the east side. Upland and slough hay can be cut in ample quantities. An excellent trail traverses the townships from the southeast to northwest corner. Duck and chicken are plentiful and Vincent lake is full of fish such as whitefish. No signs of coal, lignite or minerals of any kind were observed. The township is fairly well settled already.—*M. W. Hopkins, D.L.S., 1906.*

Range 10.

59. A good trail from St. Paul de Metis crosses this township and there are several other trails branching from this main trail. The soil is good, averaging six inches black loam with clay subsoil. Water is plentifully supplied by lakes, sloughs and creeks. Hay, both upland and slough hay, can be cut in abundance. There is not very much building or fuel timber in the township, but plenty can be cut in a radius of six miles. The northern part of the township is well wooded. Duck and chicken are plentiful and there are plenty of jackfish and perch in Vincent lake. No traces of minerals were observed. Generally the township is most suitable for mixed farming.—*M. W. Hopkins, D.L.S., 1906.*

60. The old Lac LaBiche and Ft. Pitt trail crosses the northeast corner of the township and a rough trail has been cut from section 2 to section 23 and thence across to the Lac LaBiche trail in section 25. There is also a hunters' pack trail across the township to Muskeg lake. The township is very thickly wooded with poplar, spruce and some tamarack and birch; the undergrowth also is very dense. There are several lakes, all containing good water. The northeast corner of the township contains some good hay sloughs and there are some in sections 1 and 12, otherwise feed is scarce. The average soil is 6 inches black loam with clay subsoil. No traces of lignite, coal or minerals were observed. Moose and caribou are to be found, also bear, mink, fox, &c., in fair quantities. Fish are fairly plentiful in Island lake (now called Mann lake)—*M. W. Hopkins, D.L.S., 1906.*

Range 12.

3. The route to this township is the same as that to township 3, range 13, by trail south to Kip coulée; thence along the north side of the coulée to the east end of King lake; thence southerly over the bare rolling prairie. The soil is a sandy brown loam about eighteen inches in depth generally. It would make fair farming land but for the drouth. The surface is quite rolling and in fact there are some ravines in the southeastern part of the township and a high ridge or two. It is all prairie without the least scrub or timber on it. There are one or two lake-bottoms in it. Hay is not plentiful at all but a little can be obtained almost anywhere in the township. It is of good quality, there being no rank growth in any of these townships. Water was found only in a small ravine and there was very little in it. It seemed to be a spring but was nearly dried up. The water was not tasted as we got our water in barrels from Milk river, a haul of nine miles, but the water was good and fresh. The land is not liable to be flooded. The climate was usually fine and warm and dry but at times very strong, cool winds were experienced. No summer frosts were noticed. There was no

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Range 12—Continued.

fuel in the township but coal can be had at Taber. There were no stone quarries or minerals. The only game was antelope. All of this country makes fairly good grazing land, but the scarcity of water is a drawback.—*W. G. McFarlane, D.L.S., 1906.*

Range 13.

1. The best route for reaching this township is by way of Coutts, a station on the International boundary, on the Alberta Railway and Coal Company's railway, and from thence a good trail leads directly through the township. The soil varies from clay to sand and gravel, but is chiefly three to eight inches of loam with a clay subsoil. It produces a fair crop of grass and with irrigation would doubtless yield abundantly but under the present conditions it is adapted only for cattle-raising. Several settlers whom I met and whose crops I saw were not enthusiastic about the farming possibilities. The surface is rolling prairie cut by several deep coulées running from Sweetgrass hills to Milk river. In some of these we found poplar and willow bush and a few large cottonwood trees. The quantity of timber is not sufficient to make it of any economic value, except to the settler. There are no hay lands in this township. The principal supply of water is from Milk river flowing across the northeasterly corner of the township. The supply is apparently sufficient for the present demands but I was credibly informed that in very dry seasons it ceases to run entirely. The valley is liable to be flooded during the spring freshets. The river would average about three chains in width and from three inches to three feet in depth and the current from two to three and one-half miles per hour depending upon the season. Several good springs were found along the coulées and are used by the cattle as watering places. There are no available water-powers in this township. The climate is dry and warm during the summer months, but is subject to summer frosts. The nights are always cool, and frequent violent winds sweep over the entire country. The principal fuel is coal, and indications were observed on the north boundaries of sections 24 and 23 where these lines cut the coulées. Shale and what appeared to be weathered coal was observed in several places along the coulées. There is a most bountiful supply of stone in this township and easily accessible at any place along Milk river, or on Police or Rocky coulées. The supply is practically unlimited and is used by settlers for foundations, &c., and appears to be a very good building material. No minerals of economic value were observed although a prospector showed me what he called petroleum, but declined to point out the position of his location. Chicken, a few ducks and rabbits, coyotes and kit-foxes were all the varieties of game seen in this township. There are some seven settlers but all devote themselves to cattle or horses and no farming of any account is attempted.—*A. H. Hawkins, D.L.S., 1906.*

3. The route followed to this township was by trail south from Furman's ranch to Kip coulée; thence along the north side of the coulée by trail to the east end of King's lake; thence southeasterly by south over the prairie. The trail was hard and dry, but we could not cross the coulée west of King's lake as the water from the irrigation canals make the bottom soft and miry. The soil is a brown sandy loam about eighteen inches in depth in general, but there are a few lake-bottoms which are very heavy clay. It would make fair farming land. The surface is rolling prairie with several fairly large dry lake-bottoms and a few ridges. There is no scrub or timber in it. The lake-bottoms are near the eastern side. Hay is scarce, but a little of good quality can be found in any part of the township. There was no water in the township, but the lake-bottoms showed signs of alkali. The climate was usually mild, dry and clear, but sometimes cloudy and very cool with very high winds almost hurricanes. No summer frosts were noticed. Fuel is not to be found in the township, but coal can be had at Taber. There are no stone quarries or minerals in the township. The

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 13—Continued.

only game was antelope, but ducks and geese were plentiful in Kip coulée. This township is more rolling than those to the north, and some of the ridges are somewhat gravelly and stony. There are also quite a number of fairly large lake-bottoms which show a very heavy clay soil.—*W. G. McFarlane, D.L.S., 1906.*

6. To reach this township one can drive anywhere over the prairie with the exception of the northeast corner where Chin coulée just crosses the corner, but side coulées cut it up somewhat. There are no trails in the township. The soil is usually a brown loam eighteen inches deep, but it is so dry that it would not produce good crops unless it were irrigated. It is a little stony and gravelly near Chin coulée. It is fairly good for grazing. The surface is gently rolling prairie without a sign of scrub or timber, but the northeast corner of the township is rough as it is cut up by side coulées running out from Chin coulée. Hay is very scarce, but a little of good quality can be had here and there over the whole township. There is no water whatever in this township, but there is not much sign of alkali except in Chin coulée, where it can be noticed. The climate was fine, warm and dry, but subject to high winds. No summer frosts were noticed. There is no fuel in the township, but coal can be had at Taber. There are no stone quarries or minerals. The only game seen was antelope. In each of these townships there are small depressions or hollows which hold water for a short time after a heavy rain, but water is scarce here.—*W. G. McFarlane, D.L.S., 1906.*

7. There are no trails of any importance in this township, but one can drive anywhere over it except down the banks of Chin coulée, which are high and steep. The surface is almost level prairie except along Chin coulée, where numerous side coulées cut the country up. The soil is a good loam, but is very dry. In the coulée it is heavier, but the whole township would need to be irrigated before it would be good farming land. There is neither scrub nor timber anywhere in the township. Hay is very scarce all over the township, especially down the coulée, but a little of good quality can be cut on the high land. There is no water in the township. The climate was bright and warm and dry, but subject to strong winds. No summer frosts were noticed. There is no fuel in the township, but coal may be had at Taber. There are no stone quarries or minerals in the township. The only kind of game seen was antelope. This township is badly cut up by coulées as Chin coulée runs across it and there are numerous side coulées, but the soil is rather better than in the township to the west of it.—*W. G. McFarlane, D.L.S., 1906.*

65. The township is gently rolling and much cut up by marshy lakes. Hay is abundant. The township is timbered with poplar and scattered spruce. The soil is clay loam.—*A. W. Ponton, D.L.S., 1906.*

66. Beaver lake covers a large area. Much land suitable for settlement was observed adjacent to the lake shore. The township is timbered with poplar of good size, and scattered spruce. The surface is rolling. Whitefish is abundant. An Indian settlement is located chiefly in range 13, but no reserve has yet been allotted to these Indians.—*A. W. Ponton, D.L.S., 1906.*

67. Lac LaBiche covers a large area. The country is high, rolling and well drained. It is heavily wooded with poplar, and the soil is clay loam. Fishing offers opportunities to settlers, as whitefish are plentiful in the lake.—*A. W. Ponton, D.L.S., 1906.*

68. Lac LaBiche and Square lakes cover a large area. Good land occurs between these lakes, and also adjacent to Square lake. Square lake is a fine body of water, and whitefish are obtainable in it. There is also much good land suitable for settle-

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Range 13—Continued.

ment between Grand bay of Lac LaBiche, in township 67, range 13, and the northern end of the lake, in township 68, and is accessible by trail from the Hudson's Bay post. The country is generally wooded with poplar, but fairly open ground can be found adjacent to the lake.—*A. W. Ponton, D.L.S., 1906.*

Range 14.

6. The route followed to this township was due south from Furman's ranch. This trail runs down to Kip coulée to other ranches. There is another trail running towards Furman's ranch from hay-meadows in the southwest part of the township but one can drive anywhere over the township. The soil is a brown loam about eighteen inches in depth and would make good farming land if irrigated. It is now fair grazing land. The surface is level or gently rolling prairie without a sign of scrub or timber on it. Hay is rather more plentiful in the southwestern part of this township than in the others. It is of good quality too, but is not abundant. The chief reason for the great scarcity this year seems to be the drouth. Consequently there is only short grass for the cattle and horses, so they roam farther and pick the grass off short. There was no water to be found in the township and we had no rain. The climate was fine, warm and dry, but strong winds were frequent. There is no fuel in the township, but coal can be had at Taber. There are no minerals or stone quarries. The only game seen was antelope and jack-rabbits. This township would make excellent farming land if irrigated but the scarcity of water is against it at present.—*W. G. McFarlane, D.L.S., 1906.*

7. This part of the country is all open prairie, but Chin coulée runs right across this township. The coulée is over two hundred feet in depth and in places its banks are steep, otherwise one could drive all over it. There is a trail, however, from Gardner's ranch, in township 8, range 14, to Furman's ranch in this township in the coulée in section 14. The soil is usually a sandy loam for a depth of nearly eighteen inches, but along the bottom of the coulée there is a heavy clay with boulders, while to the north of it there is mostly sand near the coulée. It is very dry, otherwise it would be very good agricultural land. If it is irrigated it should produce good crops. The surface is all prairie, usually gently rolling, except along the Chin coulée, where numerous side coulées cut it up a great deal, especially to the south. There is no timber, but two trees, willow, are growing in the coulée opposite Furman's ranch. The water is slightly alkaline, but is found only at Furman's ranch in his well, which has not gone dry but gets low at times, when too much stock is watered out of it. Part of the bottom of the coulée may be flooded at times, as some of it was once the bottom of a shallow lake. Hay is scarce but of good quality in the south part. Needless to say there are no water-powers. The weather was fine, dry and warm, but there was usually a breeze and sometimes it was very windy. No summer frosts were noticed. No fuel is to be found in the township, but coal can be had at Taber, which is within easy reach. There are no stone quarries or minerals in the township. The only game seen was antelope. This township is probably more cut up by coulées than any of those around it, and the soil is lighter close along the north side of Chin coulée, but the south side has some good land.—*W. G. McFarlane, D.L.S., 1906.*

8. The best route to reach this township is by the trail from Taber direct to Gardner's ranch although one can drive anywhere over this country as it is all open, level or gently rolling prairie. The soil is usually about eighteen inches of sandy loam. There are a few stones toward the west side of the township. It would make good farming land if irrigated. The surface is gently rolling bare prairie without a sign of scrub or timber on it. Hay is scarce but of good quality. There are a few

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 14—Continued.

hay meadows scattered over the township but they are mere hollows. The water is fairly good with but little alkali in it. It was only found at Gardner's ranch where there is an excellent spring which never fails, and also a small pond. There are no water-powers. The climate was fine, warm and dry, but subject to strong winds. No summer frosts were noticed. There is no fuel in the township, but coal can be had at Taber. There are no stone quarries or minerals. The only game seen was antelope. This township is rather more rolling than those just west of it, otherwise it resembles them closely.—*W. G. McFarlane, D.L.S., 1906.*

35. The soil (of what land there is) is first-class undulating prairie, black loam up to fourteen inches deep; but about two-thirds of the township is covered by the waters of Sullivan lake, which is of a light clay colour, alkaline and of little use. We were fortunate in finding a shallow slough of fresh water on section 29, on the peninsula, and another on section 24, on the east side of the lake, but none on the islands. There is a small bluff of poplar and willow along the lake shore on the fraction of the northwest quarter of section 27, west of the straits. This, with a few clumps of willow on the islands, is all the timber in the township. There is a coal seam along the lake shore on sections 29 and 30. I could not tell how thick it was on account of the water being only about eighteen inches below the top of the seam. Granite and sandstone boulders all along the shore of the lake, some of them very large, were all the stone we noticed. No other minerals of economic value were found. There is a great quantity of upland hay, but no regular meadows. There are no water-powers. No frosts occurred while I was there (July). We found quite a quantity of gooseberries and some raspberries on the islands. There are some poplar bluffs that would serve for fuel in the next township east of this one, but none fit for building purposes. Waterfowl and prairie chicken are plentiful, but we noticed no large game. This township can be reached from Stettler by a fair road around the north end of the north arm of Sullivan lake. If good water could be got by sinking wells, what land there is in this township, would make first-class grain farms, I believe.—*A. McFee, D.L.S., 1906.*

68. The country is rolling with clay loam soil. Owl river flows south through the eastern portion to join Lac LaBiche. Extensive hay lands occur at the mouth of this river.—*A. W. Ponton, D.L.S., 1906.*

Range 15.

6. The route followed to this township was northerly across the prairie to King lake; thence westerly up Kip coulée to this township along a trail. It is a good dry road, but one could not cross the coulée with a load where there is water. The soil is a brown loam about eighteen inches in depth and would make good farm land if irrigated. It is only a grazing country now. The surface is usually a gently rolling prairie, but the south side is considerably broken up by Kip coulée. It has no scrub or timber on it whatever. Hay is scarce, but a little of good quality could be had almost anywhere except close to the coulée, where the grass was eaten off short. The only water was that running down the coulée. It is a fine stream of fresh water, about twenty-five feet wide and from two to five feet deep, with a current of one or two miles an hour. There is no water-power. The climate was cool except in the middle of the day, but usually bright. High winds were very frequent. Light frosts were noticed. Rain was scarce. No fuel was found, but coal can be had at Taber. The only game found was antelope and ducks. The water from the irrigation ditches is a great help here, especially for grazing.—*W. G. McFarlane, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 15—Continued.

7. As the country is all open prairie one can travel anywhere over it with wagons, except at Chin coulée where the banks are steep and high, and quite a number of side coulées are found. Some of these side coulées run down to a narrow stony gorge, while others are broader and flat at the bottom, giving a good road in and out of the coulée. The road used by us was in section 30, just north of Mr. Robertson's sheep ranch. The soil is generally a sandy loam. Here and there, however, some gravel is found, and in some places the surface is quite stony. The greater part of the township, especially back a short distance from the coulée, is, however, very good farming land, but is very dry. Near the coulée quite a number of small ravines or side coulées run into the banks, some for quite a distance, cutting the sections up rather badly. The surface is all prairie. There is no timber or wood near, but some very small scrub is found in the side coulées, though too small to be of any use. Hay is scarce, but some can be found on the high land in slight hollows. It is good, as it grows on dry land, there being no sloughs in the township, except one at Robertson's ranch in section 19, which is really more of an artificial reservoir. The water is fairly good but slightly alkaline. It was only found at the ranch. Considerable alkali is seen down the coulée but not very much on the high land. There is no danger of flood in this township as there are no streams, although water may soon be running down the coulée towards the east from the irrigation canals and ditches. There are no water-powers. The climate was very hot during part of August, until we had a three days' steady rain, when it became fairly cool. No summer frosts were noticed. High winds are often a considerable inconvenience in running lines. No fuel was found in the township, but plenty of coal may be had at the mines at Taber. There were no stone-quarries or minerals found in the township. Antelope was the only game seen. In general all this country is one monotonous sameness, gently rolling bare prairie with from twelve to eighteen inches of brown sandy clay loam, not a slough to be found, no hills except along Chin coulée and the side coulées running into it. This is the only break in the surface, but it is a decided one, as its banks are invariably over two hundred feet high, steep and also often stony. Very few stones are found when one gets a short distance away from the coulées.—*W. G. McFarlane, D.L.S., 1906.*

8. As the whole township is bare, almost level prairie, one can travel anywhere over it with wagons. There are only two well-beaten trails crossing it from southeast to northwest towards Taber. The soil is a brown sandy clay loam from twelve to eighteen inches in depth, with a heavy clay subsoil. It is very dry, not even a sign of moisture at the bottom of the pits. Were it not so extremely dry it would be first-class farming land, but unless irrigated it will not likely produce a good crop year after year. The surface is all gently rolling or almost level, bare open prairie, without a sign of scrub of any kind and very few stones. Hay is scarce, but some can be found in hollows. It is of good quality, as there is no water, and it is all upland hay. Water was not to be found anywhere in the township either in sloughs or springs. Slight traces of alkali were seen. There are no water-powers. The climate was quite hot for part of August, but turned cooler after we had a three days' rain. No summer frosts were noticed. High winds were frequent. There is no fuel in the township, but coal can be had at Taber. There are no stone quarries or minerals of any kind. Antelope was the only game found. When this township is irrigated it will probably make excellent farming land.—*W. G. McFarlane, D.L.S., 1906.*

35. The soil is from four to five inches of clay loam with very hard clay subsoil. The surface of the northwest part of the township is rather rough and hilly, with pot-holes. Most of the remainder is rolling, the eastern part near Sullivan lake being gently undulating. The lake takes up quite a portion of the northeast part of the township.

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 15—Continued.

There is a long narrow lake of clay-coloured and alkaline water that extends north and south in sections 20, 29 and 32. There is (in high water) a fair sized creek of good fresh water that runs through sections 32, 28, 21, 22, and empties into Sullivan lake, in the southwest quarter of section 23; but which goes dry except for deep holes some of them ten feet deep. There is no timber and no minerals of any value. The only stone noticed was sandstone and granite boulders. There are no hay meadows of any size, but upland hay can be cut almost anywhere in the township. There are no water-powers. Waterfowl is plentiful, also prairie chicken. We saw a few antelope. No frosts were noticed. Fuel can be had about seven miles north, there being coal on the northwest arm of Sullivan lake. There is a fair wagon road to this locality from Stettler. The banks of Sullivan lake are low and the water is alkaline, clay-coloured and no good. Mr. Leithead has a small house, stables (or sheds) and a pasture fenced on the northwest quarter of section 19. There is a good spring on it. The township as a rule is suitable for mixed farming or stock-raising. Mr. Leithead had a large herd of cattle in this vicinity. The climate seems good.—*A. McFee, D.L.S., 1906.*

68. Lac LaBiche lies immediately south of the line. On the north side the country is generally spruce swamp. Lac LaBiche river leaves the lake in this range. The country is unfit for settlement.—*A. W. Ponton, D.L.S., 1906.*

Range 16.

6. The route followed was by the trail up Kip coulée. There was also a trail along the north side of the coulée running toward Lethbridge. The soil is a brown loam about eighteen inches deep, but there is some heavy clay in places and considerable stone along the sides of the coulée. It will make good farm land when irrigated but is fair grazing country now. The surface is gently rolling prairie along the north of the township, but is somewhat rough near Kip coulée, especially to the south side where rocks show out along the bank and in places the bank is quite steep. The coulée runs right across the township. There is no timber or scrub of any kind. Hay is scarce, but a little could be cut on the high land. The only water was the stream in Kip coulée, which was fresh and good. The stream would be about twenty-five feet wide, from two to five feet deep and current about two miles an hour. There is no water-power. The climate was cool with slight showers and rather cloudy. Strong winds were of very frequent occurrence. Frosts in the morning were sometimes noticed. Some small coal seams were found along the south bank of the coulée. The coal was a soft bituminous of fair quality. Coal could also be had at Taber. There were no stone quarries, but some large soft sandstones were seen in layers, but it was of poor quality. No minerals other than coal were found. The only game was antelope, ducks and jack-rabbits. The fresh water in the coulée makes this township of considerable value for grazing purposes.—*W. G. McFarlane, D.L.S., 1906.*

7. The route followed was due south by trail from Taber to Garrick's ranch in Chin coulée. The soil is good, except in places down the coulée, but is rather lighter than to the north and indeed too dry, but will make good farming land when irrigated. There is nothing but bare prairie without a sign of scrub, except in the coulée, where there are a few sticks one inch in diameter. Hay is very scarce, but there is a little in the hollows and it is good. There is no water except in Chin coulée, at Garrick's ranch in wells, a slough at Robertson's ranch in section 25, and a small spring up in a side coulée in section 34. The water is somewhat alkali. There is no water-power. No summer frosts were noticed. Coal can be had in abundance at Taber mines. No stone quarries were found. No minerals were found. The only game was antelope. The sides of Chin coulée are usually very steep and high and considerable

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 16—Continued.

rock crops out on the ridges. There had been large shallow lakes in the coulée, but they are now dried up.—*W. G. McFarlane, D.L.S., 1906.*

8. This township lies due south of Taber about five miles. There is a very good trail into it. The soil is a brown sandy loam about one foot in depth over the whole township with a heavy brown clay subsoil. It would be excellent farming land if well watered. The surface is level or very gently rolling without a sign of any scrub whatever. There is no timber within miles of it. Hay is very scarce. There are no hay sloughs and the upland hay was very short. Water is not to be found anywhere at the surface in the township, but there is a good well just to the north of it. There are some hollows that would hold water for some time but they were all dry and hard. Needless to say there is no water-power. The climate was very hot in August, but is subject to cool spells with sudden showers. Rain was not plentiful, but we had one storm which lasted steadily for three days. There is no fuel at the surface but there may be coal below it. Very little stone is to be seen. There are no minerals. A few antelope were the only game seen there. This township will make good farming land if irrigated but will not be sure of a crop on account of the drouth.—*W. G. McFarlane, D.L.S., 1906.*

35. There is a good wagon road from Stettler to this section of the country. The soil of this township is generally good, but is very hilly with numerous sloughs and pot-holes fringed with willow and small poplar. There is no timber worth speaking of. Hay can be had around most any of those sloughs or pot-holes. There is a spring on the southwest quarter of section 4 and a small lake. There are also two lakes on section 3 and one on sections 9 and 10. The water is all fresh. There are no water-powers. No frost was noticed. The climate is good. Fuel can be found without much trouble, coal at the northwest arm of Sullivan lake, about ten miles northeast, and wood about the same distance north. The only stone I noticed was granite and sandstone boulders on the ridges and around the lakes. I saw no minerals. Game, such as geese, ducks, cranes and prairie chicken is plentiful. I saw six antelope. Although the township as a rule is rather rough I consider it one of the best in this part of the country for stock-raising and mixed farming. There are no creeks or streams, but any number of deep ponds, nearly all of these fringed with tall willow which makes good shelter for stock. There is also grass in abundance, even on top of the hills. There are no squatters in the township.—*A. McFee, D.L.S., 1906.*

68. The country is rolling and timbered with good sized poplar. The soil is clay loam. Much land is fit for settlement.—*A. W. Ponton, D.L.S., 1906.*

Range 17.

6 and 7. The best route for reaching these townships is from Stirling, a station on the Alberta railway and St. Mary River railway, from which point trails lead to all parts of these townships. At the time of my visit the trail was in good condition and is said to be generally so. The soil generally is clay loam with a clay subsoil, very hard in places, and from the luxurious crop of grass found all over would appear to be fairly good agricultural land, although the small deposition of moisture in this locality might probably be a drawback to farming. The grazing, however, is excellent over both townships. The surface is generally rolling prairie except where cut by the Etzikom and Chin coulées, which range from one hundred and fifty to two hundred feet in depth through these townships. There is neither timber nor scrub in either township. The only water found was in Etzikom coulée, which is said to be the overflow from irrigation ditches, and will doubtless be utilized as the systems are extended. At present the stream is from eighteen inches to five feet deep and

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 17—Continued.

twenty to sixty links wide, with a current of from one to two miles per hour. The water is fresh, but carries large quantities of detrital matter. The valley is not liable to be flooded to any extent. There are no water-powers. A few springs along Chin coulée provide water for cattle grazing in that vicinity. There are no indications of summer frosts. The climate is said to be very equable but subject at all times to violent winds. I saw no fuel in these townships, but was informed that there were veins of lignite on Etzikom coulée in township 6, range 16. At present fuel must be procured from the nearest railway station. No stone quarries were seen. No minerals of economic value were found in these townships. Ducks, geese, a few chickens, foxes and coyotes were the only varieties of game seen.—*A. H. Hawkins, D.L.S., 1906.*

64. What good land occurs in this township is very much cut up by muskegs and swamps; the surface is rolling and covered with poplar, birch, and in places spruce and tamarack. In sections 32 and 31 there is valuable spruce timber from eight to twenty-four inches in diameter surrounding a long narrow lake and extending some distance north and south of the line. There are no hay meadows or tracts of even partially open land in this township.—*R. W. Cautley, D.L.S., 1906.*

Ranges 17 to 20.

68. The country is almost entirely spruce and tamarack swamp. The timber is small and recent fires have destroyed large areas of it. The country generally has no present value. To the north, however, Lac LaBiche river flows west to Athabaska river, and along its banks good land extends back for a quarter of a mile. The river is only navigable for small boats during exceptionally high water; at other seasons shallow rapids are frequent. A trail from Lac LaBiche makes this land accessible. Athabaska river crosses through the west portion of range 20.—*A. W. Ponton, D.L.S., 1906.*

Range 18.

28. This township may be reached by either of two good trails from Calgary or Stettler. The soil other than in the ravines, canyons and river flats, is first class from twelve to eighteen inches of clay loam on chocolate-coloured clay, with clay sub-soil, while in the ravines, canyons and river flats it is clay, growing very little or no vegetation. The surface is generally rolling with deep ravines and canyons running from every direction towards Willow creek, which creek (from marks along its banks) had from four to six feet of water in it at times. However, I would judge it to be dry the most of the year. There is only a little alkaline water in holes at present that looks like lye. Red Deer river runs through a canyon about four hundred feet deep with a valley about half a mile in width running into the township at the northwest corner of section 6 and running out a few chains east of the centre of the south boundary of 6, cutting the section up badly. Sections 4, 5, 8 and 9 are very hilly with some pot-holes, with good soil. Fuel may be got along the river banks and in some of the ravines. Although I did not come across any coal seams I noticed frequently that coal had been washed down the river and gulches. There seems to be any quantity of stone along the cutbanks in the canyons and river, mostly sandstone and some granite. I saw no other minerals. Game birds such as geese, ducks, crane, prairie chicken, plover, &c., are plentiful, and a few deer are to be found in the gulches. There is no timber in this township except along the river and some of the ravines, where some black poplar up to sixteen inches in diameter and some brush can be found. I noticed no frost. I consider it a high, dry country and suitable for grain raising or mixed farming. There are a good many stockmen (or ranchers) in

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 18—Continued.

this section of the country, the grass being good, and they have wire fences running in all directions through the prairie. Willow creek canyon runs southwesterly across the township from section 24 and joins the Red Deer canyon in section 7. It is impossible to cross this creek (in this township) with wagons, but it can be got round in range 19 or across in range 17. There are no water-powers.—*A. McFee, D.L.S., 1906.*

64.—*North outline.*—Sections 36 and 35 in this township contain patches of heavy spruce timber surrounding some lakes which occur in them, but together with section 34, are unfit for settlement owing to the rough broken nature of the surface. In these sections there is also a good deal of heavy jackpine. A narrow lake, from five to six miles in length and varying from one mile to half a mile in width, occurs in section 34, which lies almost due north and south, and is surrounded by low broken hills from 40 to 120 feet high. Sections 33, 32 and 31 contain some second class agricultural land having a rolling surface and covered by second growth poplar and heavy brulé. A small creek, flowing north, crosses the line in section 33 and flows through an old beaver meadow in section 4 of about forty acres; this meadow bears a luxuriant growth of wild hay and may extend much farther than it appeared to do from the line.—*R. W. Cautley, D.L.S., 1907.*

Range 19.

64. *North outline.*—Section 36 is covered with dense poplar, birch and spruce woods from four to eight inches in diameter, the remaining sections being covered with heavy spruce brulé and scrub, except where patches of muskeg filled with green spruce and tamarack occur. The surface is rolling and in sections 33 and 34 is higher than any of the country for miles around, being about 140 feet higher than the ground level. There is a good creek in section 35 flowing north, and a large lake, which I have been told is called Skeleton lake, and which appears to be five or six miles long in a southwesterly and northeasterly direction, and one or two miles wide, lies one or two miles to the north of sections 33, 32 and 31. Rated as agricultural land this township falls in the second class.—*R. W. Coutley, D.L.S., 1907.*

Range 20.

51. This township was at one time part of a timber reserve, but fires have destroyed the timber and it is now covered with thick scrub, and in places, scrub with a heavy windfall. The east part of the township is rolling; the west is level. There are a number of hay sloughs and a number of large lakes. I found a number of squatters in the township, some of them having been there for fifteen years. Cattle-ranching is their principal occupation. They say that the reason for not farming is, that they are afraid that the government might force them to leave.—*G. J. Lonergan, D.L.S., 1906.*

59. We followed the Victoria trail to the intersection of an Indian pack-trail near the north boundary of section 31, township 58, range 19. Then we followed this pack-trail to section 20 township 59, range 20. The soil is a black loam and clay subsoil, suitable for farming purposes. The surface is level and covered with thick poplar and willow. There is no timber. There are no hay lands. Namepi river flows through the southwestern part of the township. The water in the sloughs is fresh. There are no water-powers. The climate was cold and wet at time of survey (July and August) with no summer frosts. The fuel is dry poplar in abundance. No coal was found. No stone quarries were observed. There are no minerals. The game is moose, deer and ducks.—*J. C. Baker, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 20—Continued.

64. *North outline.*—This township is covered with small isolated patches of heavy timber surrounded by brule, and is well adapted for mixed farming. The surface is gently rolling and much of it would be easy to clear. There are two good creeks, one in section 35 and the other in section 33, both flowing north and both permanent, while there is a lake one and one-half miles long in section 31. A large lake which I have been told is called Skeleton lake and which appears to be five or six miles long in a southwesterly and northeasterly direction and one or two miles wide, lies about one mile to the north of sections 35 and 36.—*R. W. Cautley, D.L.S., 1907.*

Range 21.

58. We reached this township by following the Victoria trail as far as the north boundary of township 57, range 20; then by following the boundary west to township 57, range 21 we cut a trail to the northeast corner of section 16. The soil is principally black loam with clay subsoil. When cleared it will be suitable for farming. This township is level and covered with thick willow and poplar. There is no timber. There is no hay land in this township. The water in lake No. 1 is alkaline, but the water in the sloughs is fresh. There are no creeks. At the time of survey, the sloughs were full of water. There is no water-power. The weather was cold and wet during the time of survey (June and July). No summer frosts occur. Plenty of dry poplar may be had anywhere in this township for fuel. No coal was found. No stone quarries or minerals were noticed. Ducks, moose, deer and skunks were seen.—*J. C. Baker, D.L.S., 1906.*

64. *North outline.*—This township is covered for the most part with thick second growth poplar and grey willow, small and easily cleared, with isolated patches of dry spruce or green tamarack from four to twelve inches diameter, and is well suited to the needs of settlers who desire to go in for mixed farming, being near to Athabaska Landing and having egress thereto by a very fair wagon trail which crosses the line at the northeast corner of section 32. The surface is gently rolling and the soil good, much of it being in the first class. A creek, which affords a permanent supply of water, flows in a northeasterly direction across the north boundary of section 34, and two tributaries of another creek flow north across section 32, while there is a lake of about three hundred acres in extent, and surrounded by hay marshes across the north boundary of section 36.—*R. W. Cautley, D.L.S., 1907.*

Ranges 21 and 22.

68. The country is covered with much spruce swamp. The timber is generally small and of little commercial value. Areas occur which are slightly elevated above the swamp lands, but as a whole it is unfit for settlement.—*A. W. Ponton, D.L.S., 1906.*

Range 22.

11. This township can be reached from Lethbridge by a trail which passes through it, leading from Lethbridge to Bow river. The trail is in good condition and can be travelled at any season of the year. The soil of this township varies from a sandy loam to a stiff clay, though through some of the interior parts there are coarse gravel ridges. This township up to the present has been used for grazing. The soil, however, would be suitable for grain growing, if the season were at all favourable, but as a rule it has been too dry for farming. Settlers are coming in and the land is being cultivated for grain growing. The surface of this township is open, rolling prairie. No timber whatever exists on it. Upland hay can be cut from almost any part of the

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 22—Continued.

township and marsh hay can be cut about Keho lake. At the time of this present survey (May and June) there was plenty of surface water in the township owing to the excessive spring rains. A small creek was crossed running southeasterly out of section 1. Keho lake was swollen to several times its ordinary size, flooding nearly all of section 31 and parts of sections 30 and 32. Some of the farmers have dug wells, and obtained water at from thirty feet to one hundred feet. This water can be used but is more or less alkaline. Keho lake water is strongly alkaline. The only fuel is coal and is freighted in from the Lethbridge mines. One settler stated that in digging a well on section 8 he went through several small veins of coal. Coal crops out of the surface on section 18; this coal has been used by some of the settlers, but so far is not of a very good quality, as it weathers very easily on being exposed to the air. No doubt better quality would be found by going deeper into the seam. The climate is dry and no summer frosts were reported. No timber exists in this township, no water-powers, no stone quarries and no minerals except coal, as mentioned above. No game was seen.—*Lennox T. Bray, D.L.S., 1906.*

64. *North outline.*—This township is covered for the most part with poplar and willow scrub, with occasional patches of muskeg filled with spruce and tamarack from 4 to 8 inches in diameter. The surface is a high rolling plateau 250 feet above Tawatinaw river, which crosses the north boundary of section 31, in a northerly direction. A creek crosses the north boundary of section 34, and a tributary of the same creek crosses the north boundary of section 35, both flowing in a northerly direction. The Athabaska Landing wagon road and Government telegraph line cross the north boundary of section 31. Rated as agricultural land, this township is of the first and second class.—*R. W. Cautley, D.L.S., 1907.*

65. This township has been subdivided, and there are some settlers already established in parts of it who seem to be doing very well. One of them, Mr. William F. Smith, keeps a large stopping place on the southwest corner of section 6, and as an instance of the amount of travel which takes place over this road, it may be of interest to state that it is no uncommon thing for thirty freight teams to stop overnight.—*R. W. Cautley, D.L.S., 1907.*

Range 23.

64. *North outline.*—This township is for the most part covered with poplar and willow scrub, with occasional bluffs of poplar from two to four inches in diameter. There is a good deal of brulé, and the occasional stretches of muskeg are full of green spruce and tamarack from two to four inches in diameter. The surface consists of a high rolling plateau about 250 feet above Tawatinaw river, and there are several small creeks flowing across it in a northerly direction. Rated as agricultural land, this township is from first to second class and is suitable for mixed farming. The Athabaska Landing wagon road lies a quarter of a mile east of the northeast corner of section 36.—*R. W. Cautley, D.L.S., 1907.*

68. The country is broken by Athabaska river and spruce swamps, and is unfit for settlement.—*A. W. Ponton, D.L.S., 1906.*

Range 24.

64. *North outline.*—The north boundary of sections 36, 35 and 34 in this township lies principally in muskeg covered with spruce and tamarack from two to eight inches in diameter. The north boundary of sections 33, 32 and 31 traverses a rolling country covered with poplar and willow scrub and old brulé, and is suitable for

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 24—Continued.

farming or grazing, the soil being second class. There are no creeks which cross the line in these sections, but from the presence of small patches of muskeg I believe water would be readily found in summer. There is sufficient timber in the vicinity to supply the needs of settlers both for fuel and farm buildings.—*R. W. Cautley, D.L.S., 1907.*

68. The country is broken by long lakes running north and south, with high ridges between, timbered with fair sized poplar, birch and scattered spruce. This range offers good opportunities to a limited number of settlers, as hay is available in fair quantities and openings in the valleys afford pasture. A trail from Baptiste lake to Moose portage affords access.—*A. W. Ponton, D.L.S., 1906.*

Range 25.

61. This township was reached by following the main trail to Edison to the northeast corner of section 31, township 60, range 25; then following the trail due north to lac des Jones; thence by the eastern side of the lake. The trail from the east side of the lake runs northwesterly to the northeast corner of section 19. The soil in this township is similar to that found in swamps and muskeg country. It is not suitable for farming. The surface is level, covered with poplar, spruce and tamarack. There is large spruce and tamarack from two to four feet in diameter found in sections 21, 20, 29, 30, 31 and 32. There is no hay. The water in the lakes is fresh. There is plenty of water everywhere in this township. There is one creek which flows westerly entering the township on the north boundary of section 34, and flowing through sections 34, 27, 28, 29, 20 and 19. The climate was dry and warm at the time of survey (August and September), with no frosts. Plenty of dry spruce, tamarack and poplar can be secured for fuel. No coal was found. There are no stone quarries or minerals. The game is moose, deer and ducks.—*J. C. Baker, D.L.S., 1906.*

64. *North outline.*—In this township the land varies a good deal in character; section 36 contains a long irregular-shaped lake surrounded by low broken hills from 40 to 120 feet high and is suitable for grazing rather than agriculture. Sections 35, and 34 contain so much swampy land in the vicinity of the line as to make it third class agricultural land. Sections 33 and 32 are covered with light poplar and willow scrub alternating with bluffs of poplar and spruce from three to six inches in diameter. The land in these sections is of the first class, having an undulating surface and, as far as one can judge from snowshoes, a rich soil is shown by the surface indications, vegetation and general appearance, while section 31 is covered with heavy dry spruce timber and windfalls and would seem to have a lighter soil from the vegetation and presence of second growth jackpine. There are no creeks of such a size as to be noticeable in winter in this township. Numerous tracks of dog sleighs on the lake in section 36 indicate that Indians use it as a route of travel. From a high point on the line in section 36 two lakes are visible to the north-northwest, the bigger of them, estimated to be eight miles distant, probably being Baptiste lake.—*R. W. Cautley, D.L.S., 1907.*

Range 26.

61. There is no trail into this township. In dry weather a wagon may pass through sections 24, 23, 27 and 28 by a trail made by my party. The country, however, is muskeg and difficult to pass through with wagons. The soil along the south boundary and extending approximately one mile into this township is black loam with sandy subsoil. It is suitable for farming but is covered now with thick second

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 26—Continued.

growth poplar. The rest of the township is swamp and muskeg covered with tamarack and spruce too small for timber but suitable for fence rails and firewood. It is not suitable for farm land. There is no hay land. The water is fresh. There is one large creek which flows through sections 24, 23, 26, 27, 28, 29, 32 and 31. The current is slow. There is no water-power. The climate was mild and dry during September and October, with no frosts. Plenty of dry tamarack, poplar and spruce can be obtained for fuel. There are no stone quarries. No minerals were discovered. The game is similar to that found in other parts of Alberta.—*J. C. Baker, D.L.S., 1906.*

64. *North outline.*—This township is principally covered with a thick growth of small poplar and willow, and sections 36, 35, 34 and 33 comprise land well adapted to mixed farming, having a gently undulating surface and good soil, of the first and second classes. In sections 32 and 31 the character of the country gradually changes; small ravines filled with muskeg occur, with patches of heavy timber and brulé and second growth jackpine ridges. The surface becomes more irregular and the soil poorer, so that these two sections range from second to third class in rating. A creek ten feet wide, affording a permanent supply of water, occurs in section 36, and a small creek flows into a marshy pond, to the north of the line, in section 31. There is an abundant supply of timber for the needs of settlers throughout this township.—*R. W. Cautley, D.L.S., 1907.*

Range 27.

58. The north half of this township is reached from Morinville by a cross country trail which leads to Sutherland's mill on or near section 5, township 59, range 26, west of the fourth meridian. Another trail running north from Riviere-qui-barre joins the first near the northeast corner of the township. The south part is reached from Riviere-qui-barre, by going through Independence. This trail strikes about the middle of the south boundary of section 3, which it follows; then after following the south boundary of section 4 for a distance of about a quarter of a mile it turns towards the northwest, leaving the township on the east boundary of section 7. The soil is light in the northern part, improving as we go south. It is a good coat of black and sandy loam over a clay subsoil, altogether suitable for farming. The surface is rolling. Sloping north for about one and one-half miles from the correction line it then drops to the south for the remainder of the distance to the south outline. Except for a part of the east boundary of section 33, which goes through a spruce swamp, the opening of the meridians for the first mile and a half was easy work through small poplar and light brush. From there large areas of poplar from four to twelve inches in diameter are often met with and along the chord north of sections 7 to 12 the brush, especially on the east, was fairly thick and the cutting heavy. The same may be said of the part of the meridians between the two southern chords, especially in the east half. Around the lake on sections 23, 24, 25 and 26 there is a large swamp growing spruce averaging about eight inches in diameter, it reaches to the south boundary of section 23. This timber is good only for fuel. The best timber, consisting of spruce and poplar from six to twelve inches in diameter, is found along the north boundary of section 22. There is on every section sufficient wood to answer all the wants of the settlers for building and fuel purposes for years to come if properly taken care of. There are small hay sloughs on nearly every section, but the most extensive ones are on section 31 and on section 16, where a large quantity of hay has been cut this summer (1906). The water is good wherever found, but the settlers mostly all get their supply from wells they have dug. There are no water-powers nor quarries, nor any minerals that I know of. The only fuel available in the immediate vicinity is wood, but there is plenty of it, especially in the southern part. A few

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 27—Continued.

partridges and some rabbits are the only game that I have seen. There is quite a number of settlers in the township and they all seem to be satisfied with the soil and with their prospects generally.—*Geo. P. Roy, D.L.S., 1906.*

59. *Southern portion.*—The northern part of this township was surveyed last year, and all that has been said about it is applicable to the southern sections or mostly all. This southern part can be reached from Edmonton through Rivière-qui-barre and from there by the trail to Sutherland's mill which is situated on or very near section 5, township 59, range 26, and from there a wagon trail runs west on the correction line. Another trail going through Morinville leads to the same mill. Both trails are in good condition. The soil is generally a fair coat of black loam over a clay or sandy clay subsoil, very well adapted to farming. It becomes lighter farther south. The surface is rolling, mostly covered with small poplar, willow brush and the half burnt remains of old windfalls. There is a chain of swamps and sloughs on part of sections 11, 10, 3, 4 and 5 which reduces considerably the area of farming land in these sections. Most of these sloughs are now dry and partly covered with willow brush, and if cleared would produce a large crop of hay. The settlers have been cutting hay there already. These sections contain also swamps growing spruce and tamarack measuring from two to eight inches in diameter. The space affected by the swamps alternating with hay sloughs is unfit for farming purposes and might be reserved for the preservation of the water supply and the fuel that it contains. Good timber, that is poplar and an equal amount of spruce measuring eight to twenty inches in diameter, is found on the quarter sections cornering on the monument at the northeast angle of section 9. Outside of these timber lands there is, mostly on every section, sufficient poplar and dry spruce for the first wants of the settlers, but unless taken special care of, wood will become scarce in a short time and fuel will have to be procured from the outside. Good water is found in sloughs which are not dry, but the settlers have dug wells which give them all the water they want, some of these wells being forty feet deep. The climate is the same as in Edmonton. There are no water-powers and I have seen no stone quarries or evidence of any minerals. Fuel, as already stated, will be scarce after a few years unless the timber that remains is economically used. Game is not plentiful. A few partridge and rabbits are all the game I have seen. Along the correction line mostly all the sections are occupied and the settlers seem to be satisfied with the soil and with their prospects generally.—*Geo. P. Roy, D.L.S., 1906.*

61. The trail into this township crosses the south boundary near the northeast corner of section 35, township 60, range 27; thence crosses sections 2, 11 and 10 to Pembina river. The soil along the river is suitable for farming, but that lying half a mile from the river is muskeg and unsuitable for farming. The country is level, covered mostly with tamarack and spruce swamp. That lying along the river is covered mostly with poplar. The timber is small in this township, except in the northwest and southwest quarters of section 10, where the spruce along the river is large, being from one foot to three feet in diameter. Some hay meadows are found on the west side of Pembina river. They are small. The kind of hay is redtop. The water in the sloughs and lakes is fresh. Pembina river is fresh water. Bath creek which enters the township near the northeast corner of section 35, township 60, range 27, flows north-westerly and empties into the Pembina. The climate is cold and damp in October and November. There are no summer frosts. There is plenty of dry tamarack, spruce and poplar for fuel. No coal was found. No stone quarries or minerals were noticed. The game is similar to that found in other parts of Alberta.—*J. C. Baker, D.L.S., 1906.*

64. *North outline.*—The two and one-half miles contained in this township consist of stretches of muskeg, filled with spruce and tamarack from three to eight inches

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 27—Continued.

in diameter, alternating with irregular sandy ridges covered with jackpine from four to eight inches in diameter. There are no creeks in it, and the land should all be rated as third class agricultural land.—*R. W. Cautley, D.L.S., 1907.*

Range 29.

13. The best route for reaching this township is from Claresholm, a station on the Calgary and Edmonton branch of the Canadian Pacific railway. To reach the southern portion of the township the trail following Trout creek is taken; while the northern part is reached by the trail following Willow creek. Both trails were in good condition, except that they were considerably drifted with snow at the time of my visit (November). The soil is generally of second quality, being a clay or sandy loam, with clay subsoil, and from the excellent crop of grass all over the hills would appear to be very fertile, but owing to the very hilly character of the surface it is best adapted to cattle and sheep grazing. The surface is very hilly prairie, the township being crossed by Trout creek at the south and Willow creek along the north. The north side of the divide in section 18 is covered with willow scrub and a small amount of poplar and cottonwood and a few spruce, the north halves of 17 and 18 being about one-third timbered. Along the west shore of Caron lake the surface is covered with a heavy growth of willow scrub, with a few poplar, pine and spruce, and along the east boundary of sections 2 and 11 were several patches of scrub. The only timber observed was in the southwest corner of section 6. Here there is a small tract of fir, spruce and hemlock, the fir ranging from two to three and one-half feet diameter and the spruce and hemlock four inches to two feet in diameter. This covers one-third of the west half of the southwest quarter of section 6. Hay could be cut almost any place in this township not covered with scrub or timber, and is of the arrow or spear grass variety, but at the present time it is cut chiefly in the valley of Trout creek, where the growth is most luxuriant, but the quality inferior to that on the hills. The water is all fresh, Trout and Willow creeks being spring streams, while several smaller streams fall into these creeks, rising in the interior of the township. The supply is apparently sufficient and permanent. Trout creek is ten to twenty links wide, one to three feet deep, current two and one-half to three miles per hour, and the valley is flooded during spring freshets from one to three feet. As I did not cross Willow creek in this township I can give no information regarding it. There are no water-powers on Trout creek. The climate is said to be warm during the summer months, and generally mild winters with little snow but subject at all times to very high winds. The fuel most easily available in this township is wood—poplar, fir, spruce and cottonwood, and can be procured along the creeks and in the southwest portion of the township. No coal or lignite veins were observed in the township. There are no stone quarries. Outcroppings of sandstone were observed around the lake at the southeast corner of the township, but it was very difficult of access. No minerals of economic value were found in this township. Chickens, foxes, coyotes were quite numerous, with a few deer and wolves, and ducks and geese during the period of open water, and the streams are well supplied with mountain trout, of which there are two varieties.—*A. H. Hawkins, D.L.S., 1906.*

Range 30.

1. A good wagon road known as the Oil City trail leads from Pincher Creek into this township. The soil is gravelly and not adapted for agricultural purposes. The surface is very broken by high bare mountains. The valley of Oil creek, which varies from a quarter to a half mile in width, is more or less timbered with spruce, pine and balsam in all sizes. The water is fresh and the supply plentiful. A water-power could

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TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 30—Continued.

be developed from Oil creek. The fuel is wood and can be procured from any section. No hay exists in this township. Good limestone can be had from almost any section. The game is deer and brown bear. Mountain trout are also plentiful. The only mineral found was crude oil. The Rocky Mountain Developing company have completed drilling a well on the northeast quarter of section 30, from which they can pump a small quantity of oil. They have another well nearly completed on the same quarter and an outfit ready to start in a second well on the same quarter. The Oil City townsite is laid out partly on section 25, township 1, range 1, west of the 5th meridian, and partly on section 30, township 1, range 30, west of the 4th meridian. Spruce, balsam and pine timber, in small sizes, is plentiful throughout the township. Trees up to thirty inches in diameter were found on the southwestern part of section 25, and on section 11. There is, however, no large quantity of this heavy timber. The climate is very changeable and no doubt summer frosts do occur.—*Lennox T. Bray, D.L.S., 1906.*

3. *Sections 13, 24, 25 and 36.*—These sections lie only a couple of miles west of Twin Butte, and can be easily reached from it by good trails which lead into and near these sections. The soil is of a good quality, being a deep rich loam with a clay subsoil. It would be suitable for grain growing, but owing to the high altitude of the locality it is very difficult for the grain to ripen. The surface of these sections is rolling and mostly covered with thick scrub willow and poplar. Poplars are found up to six inches in diameter. There are a few sloughs and open ridges throughout these sections. The water in some of the sloughs is fresh, while in others it is brackish. Several good spring creeks flow easterly across sections 13 and 24. The climate of this locality is apt to be very changeable, owing to it being so near the mountains. Summer frosts occur. The fuel used is wood, and can be procured from some of the canyons leading into the mountains about three or four miles west of these sections. No water-powers were found in these sections. No stone quarries, no hay and no traces of minerals were found. Deer and prairie chickens are the only game. Section 13 is rolling, in its central part more or less open, on its boundaries it is covered with thick willow and young poplar. Section 24 is partly open prairie and gently rolling. Sections 25 and 36 are rolling land covered with thick willow and poplar up to six inches in diameter. There are a number of sloughs on these sections, and the northwest quarter of 36 is broken by Margaret lake.—*Lennox T. Bray, D.L.S., 1906.*

4. This township can be reached from Pincher Creek by good trails which lead into it. The soil is of a good quality, being a deep rich loam with a clay subsoil, and would be suitable for grain growing were it not for the high altitude of the locality. Some of the settlers grow very good oats and intend trying other grains. The surface is rolling and scrubby, though there is nearly as much clear land as there is scrub. There is no timber in this township except young poplar which on parts of sections 8 and 17 attain a size up to six inches in diameter. Some black poplar along Drywood river through section 8 were found up to twenty inches in diameter. Young poplar occurs in almost every section. Good hay is harvested from any of the openings in the township. A good hay meadow occurs on the south half of section 9. The water in all the streams is fresh and the supply seems to be permanent. Some of the sloughs in the southeastern part of the township are inclined to be alkaline. The fuel used is mostly wood and can be procured just west of this township in the ravines leading into the mountains. No water-powers occur in this township. No stone quarries and no indications of minerals were found. The game is prairie chickens, and a few deer were seen. The climate of the locality is very good. Although no summer frosts occur, still frost does occur quite early in the fall. This locality up

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Range 30—Continued.

until the present has been used for grazing purposes. Sections 1, 2 and the east half of 3 are rolling land covered with willow scrub and young poplar. There are open areas all through these sections. Sections 1 and 2 are broken by Yarrow creek, which has high banks. The southeast quarter of 2 and the southwest quarter of 1 are broken by a lake. Section 4 and the west half of section 3 are high rolling land and mostly open. Section 5 is rolling and covered to a good extent with scrub. Sections 8 and 9 are broken by Southfork creek. Section 8 and the north half of 9 are high rolling land mostly covered with scrub and young poplar up to six inches in diameter. The south half of section 9 is mostly open and level and makes a very good hay meadow. Sections 10, 11 and 12 are rolling land and partly covered with willow scrub. Some of section 12 has been cultivated. Sections 15, 16 and 17 are broken by Northfork creek and are partly covered with scrub. Sections 21 and 22 are gently rolling land and mostly covered with willow scrub and young poplar. Section 20 is mostly open and gently rolling.—*Lennox T. Bray, D.L.S., 1906.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

1. A good wagon road known as the Oil City trail leads from Pincher Creek into this township. The soil is gravelly and not adapted for agricultural purposes. The surface is very broken by high bare mountains. The valley of Oil creek, which varies from a quarter to a half mile in width, is more or less timbered with spruce, pine, and balsam in all sizes. The water is fresh and the supply plentiful. A water-power could be developed from Oil creek. The fuel is wood and can be procured from any section. No hay exists in this township. Good limestone can be had from almost any section. The game is deer and brown bear. Mountain trout are also plentiful. The only mineral found was crude oil. It can be seen oozing out of the banks of Seapage creek on section 25. Several prospecting outfits are working in these townships drilling for oil. The Rocky Mountain Developing Co. have part of a drilling outfit on the southeast quarter of section 25, and part of an outfit on the northeast quarter of section 14. The Pincher Creek Oil Co. are drilling a well on the northeast quarter of section 25. The Oil City townsite is laid out partly on section 25, township 1, range 1, west of the fifth meridian, and partly on section 30, township 1, range 30, west of the fourth meridian. Spruce, balsam and pine timber, in small sizes, is plentiful throughout this township. Trees up to thirty inches in diameter were found in the southwestern part of section 25 and on section 11. There is, however, no large quantity of this heavy timber. The climate is very changeable and no doubt summer frosts do occur.—*Lennox T. Bray, D.L.S., 1906.*

2. This township can be reached by a pack trail which branches from the Oil City trail just as it crosses Blakiston brook in township 2, range 30, west of the fourth meridian. By doing a little road building and driving up the bed of Blakiston brook we were able to use a wagon as far as section 9, but beyond this section it would be difficult to get a wagon. The soil of this township is gravelly and not at all adapted for any agricultural purpose. The surface is very broken by high bare mountains. There are a few small flats which are more or less covered with scrub. Jackpine, spruce and balsam grow on the mountain sides up to a certain height. The water is fresh and the supply appears to be sufficient. The fuel used is wood and can be procured from any section. There is plenty of good limestone in every part of the township. No hay of any account grows in this township, and no indications of minerals were found. The climate is very changeable, summer frosts undoubtedly do occur. The game is brown bear, deer, sheep and goats. Water-power can be developed on both

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1—Continued.

forks of Blakiston brook by damming. On section 14 the south fork has a fall of about twenty-five feet. The timber is pine, spruce and balsam. Most of the flats and mountain sides are covered with trees from two to eight inches in diameter. On the northern parts of sections 21 and 22 our lines ran through a block of timber measuring from six to forty inches in diameter. Another block of large timber was seen to be located on about the south half of section 8. In surveying this township I was compelled to run a good many quarter section lines in order to follow the courses of Blakiston brook. The valley adjoining this brook varies in width from about a quarter to a half mile, though in places it may be narrower. My lines on both forks of Blakiston brook could have been continued about two miles farther west without any great difficulty, but on account of being called to another district I was compelled to stop where I did.—*Lennox T. Bray, D.L.S., 1906.*

15. It is about twenty miles by a fairly good but hilly road from this township to Nanton, a small but flourishing town on the Macleod extension of the Calgary and Edmonton branch of the Canadian Pacific railway. Another trail from Stavely, also a town farther south on the same line of railway, joins the former trail a few miles east of this township. The soil is composed principally of a black loam, varying in depth from three to eighteen inches with generally a clay subsoil. On the hills and ridges the soil is stony and gravelly. It is suitable for the growth of any crops peculiar to this latitude, providing the climatic conditions are favourable. The surface is very hilly and is partly prairie, but mostly bush and brush. The timber still standing is somewhat scrubby. There has been some very good timber, such as banksian pine, spruce and poplar. The best of it, however, has already been cut. There was a portable sawmill just south of the south boundary of section 1, which has since been removed to another locality. The settlers forty and fifty miles to the east have also for some years past been cutting the best of the timber for their necessary farm buildings. There are no regular hay meadows, but the herbage along the sidehills and valleys attains a luxuriant growth and makes excellent hay. It is a mere matter of humidity, as when there is plenty of rain there are good hay crops, without any irrigation. If, however, it happens to be a particularly dry season, irrigation ditches are made use of. The water found here is of a superior quality, as many springs take their rise in the hills. At the time of my survey they were running strong, and showed no signs of being easily exhausted. There are no water-powers in the township. The climate, owing to the altitude, and the close proximity of the mountains, is not favourable for the ripening of cereals, and only the hardiest kind of roots or vegetables do well. So far there is plenty of fire-killed timber for fuel, but coal may be obtained at no great distance in the foothills. There are no stone quarries, but stone may be procured on the ridges, in the future, if required. No minerals, of any economic value, were found. Game also is scarce, only a few grouse or partridges having been observed. Taking into consideration the vigorous growth of the grasses and the fact that the climate is unfavourable for the ripening of cereals, it is plain that this township is more adapted for cattle-raising. The herbage for pasturage is in abundance and although the winters at times may be severe, with sufficient care and a good supply of provender for exceptionally bad seasons, no heavy losses may be anticipated. As a rule, horses do not require to be fed during the winter months, provided they have the run of new pasture, even if the snow is deep, as they can rustle or paw, but cattle, if a crust forms on the snow, require to be fed. Fortunately, even after a heavy fall of snow, a chinook may spring up and thaw the snow, and thus enable the cattle to rustle their own sustenance, without any particular effort on the part of the cattlemen. When hay is not very abundant a snow plough may be used, to clear the prairie for the benefit of the calves. A number of settlers have come in within the year, and nearly all are provided with the means of sustenance, having brought a number of

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1—Continued.

cattle along. Those that have no cattle are getting a start by working out for wages. They are a very desirable class of settlers.—*C. F. Miles, D.L.S., 1906.*

Range 2.

5. This township is reached from Pincher Creek by a good wagon road which passes through it leading to the oil wells on the south fork of Oldman river. The soil is more or less gravelly, and is best suited for grazing, though a number of settlers are trying to farm it in small patches. The surface is very rough and broken, though there are some small flats which are not. It is covered mostly with scrub poplar, jackpine and spruce which will be mentioned below. Good hay is cut on parts of sections 8, 21 and 29, and the open slopes of some of the hills. This township is exceptionally well watered by numerous spring creeks, which afford the best of fresh water. Mill creek runs northerly through the eastern tier of sections. Gladstone creek runs northeasterly across the southern and central part of the township. Beaver creek runs northeast across the northwestern part of the township. Mill creek has been used for driving timber, and with a few dams Gladstone creek could also be used. The climate is very changeable and summer frosts occur. Plenty of limestone could be quarried out of the banks of Mill creek, and in various parts of the northwest part of the township. The fuel at present is wood, which can be procured from almost any section. Coal shows itself in the north bank of Gladstone creek near where it empties into Mill creek. No other minerals were seen. The game is black-tail deer and brown bear. Sections 13, 24 and 25 are broken by Mill creek, and are mostly timbered west of the creek. Section 35 is rolling land covered with a thick growth of poplar. Section 26 is rough and broken in its west half; the east half is open, nearly level land. Section 23 is open through its central part, but rough and covered with timber in its northwest and southern parts. Section 14 is sloping, rolling land covered with spruce, pine and poplar. Section 15 is more or less open. Sections 16, 17 and 18 are high rolling land, covered mostly with spruce up to ten inches. The south slopes of the hills are open in patches. These sections slope to the north. Sections 19, 20, 21 and 22 are rough and high rolling land covered mostly with spruce and poplar. Spruce measuring up to fifteen inches in diameter covers the central eastern part of section 21. Section 27 is very rough and broken by hills. Good timber up to twelve inches in diameter is to be found on it. Section 28 is partly open in the southeast quarter; the southwest quarter is very rolling, and covered with pine and spruce up to six inches in diameter. The north half is very rough and broken. Spruce up to twelve inches in diameter is found on it. The east half of section 29 is rough, rolling land, lightly timbered; the west half is partly open. Section 30 is high, rolling land covered with spruce, pine and poplar up to eight inches in diameter. Section 31 and the north half of section 32 are very rough, and broken by high bare hills. Good timber grows in the ravines. The south half of section 32 is sloping, rolling land, covered with a good growth of spruce and pine up to eight inches in diameter. A part of the southeast quarter is open level land. Section 33 and the west half of section 34 are very rough, and broken by high hills and ravines. The east half of section 34 is rolling land covered with a thick growth of poplar. All through this township the south slopes of the hills were less wooded than the north slopes, and in most cases the timber was young poplar.—*Lennox T. Bray, D.L.S., 1906.*

13. This township may be reached by a fair trail from Nanton or Stavely, on the Calgary and Edmonton railway, about thirty-five miles distant. The soil in the bottom lands consists of a rich black loam, which, if climatic conditions permit, could produce any crops. A high ridge traverses the centre of the township; there are two gaps, through which Langford and Westrup creeks flow into the south branch of

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2—Continued.

Willow creek. Another high rocky ridge cuts through the easterly tier of sections. Similarly, other rocky ridges cut through the westerly half of this township. The valley between these ridges furnishes excellent pasture, and in the open parts many hundreds of tons of hay are cut by the ranchers for their cattle. The ridges are more or less covered with timber, some of which is of considerable size, such as spruce and jackpine; some good fir is also to be met with. Much of it has already been cut by settlers and ranchers from a distance, but there is still a bountiful supply for future needs. A luxuriant growth of grass is found on nearly all the uplands. The supply of water in the creeks appears to be unlimited, and is of good quality, apparently but little impregnated with alkali. There are no available water-powers. With regard to the climate the reports are contradictory. Each one interviewed makes his statements to suit his own interests. Ranchers affirm that no crops, either cereal or roots can be grown here, whereas settlers maintain the contrary. Of fuel, there is a plentiful supply in the hills for years to come, consisting of poplar, spruce and jackpine. Coal too, may be procured at no great distance. There are no quarries being operated. Minerals of economic value were not observed. With regard to game, it is being rapidly exterminated by the Stony Indians, who are in the habit of hunting to the west of this township in the early winter. Some of them, a part of a large band, called at my camp to dispose of some of the deer they had killed in this vicinity. The valleys of this township are pretty well settled, but owing to some differences between the ranchers and settlers, it is possible that the latter may have to abandon their homesteads and improvements and look for land in some other locality. All in all, I consider this township essentially a cattle country.—*C. F. Miles, D.L.S., 1906.*

14. Fairly good, but very hilly trails reach this township from Nanton and Stavely—about twenty-five miles distant—two small but flourishing towns on the Macleod extension of the Calgary and Edmonton branch of the Canadian Pacific railway. The nearest post office is Willows, on section 12, in township 14, range 1, on Willow creek, where there is a weekly mail from Nanton. The soil, generally, is a rich black loam varying from three to eighteen inches in depth, with clay subsoil. On the hills and ridges it is mostly gravelly and stony. It is suitable for raising any crops indigenous to the altitude, provided climatic conditions are favourable. The surface is mainly hilly, high ridges traversing the township from south to north with intervening valleys. A fine valley occupies parts of sections 2 and 3, 10 and 11, 15 and 14 and sections 22 and 23. There is also the valley of Willow creek, which lies in parts of sections 25, 26, 27 and 28. Another valley runs from south to north through the easterly halves of sections 4, 9, 16 and 24, but it is more or less swampy and brushy. Timber is chiefly found along the side hills, but not in sufficient quantities to be of a marketable value. It consists of poplar, banksian pine and spruce. On the tops of the ridges generally some Douglas fir is to be found, and although sometimes quite large, it appears gnarled and stunted. A considerable quantity of hay is cut in the valley, wherever it is clear of willow scrub and sage brush. There are no water-powers, stone quarries or minerals of economic value. The climatic conditions are not favourable for the ripening of cereals, and no attempt seems to have been made in this direction owing to the prevailing summer frosts. The hardiest kinds of vegetables and roots might ripen, but it is doubtful if potatoes would. For fuel there is an abundance of fire-killed timber along the side hills, and in some of the ravines. Game is not plentiful. Some grouse and partridges were observed, and there were signs of deer. The creeks, however, are well stocked with different varieties of trout and grayling. The water from the springs rising in the hills or ridges is pure and palatable, as is also the water in Willow and Rice creeks, which are fed from the springs. An old deserted cow camp in section 28 has again been taken possession of by some cattlemen. They have both cattle and horses, and they cut

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 2—Continued.

a large quantity of hay last summer on sections 27 and 28, mostly on the uplands. A rancher on section 10 has not been in possession many years. He cuts his hay on the easterly halves of sections 3 and 10. The settler on the southwest quarter of section 14 has but a small number of horses. He is quite a new arrival, and cuts his hay on his own claim. These are the only settlers in this township. The beef raised here, as is the case in the other townships of my survey, is of a superior quality. I have frequently seen cattle as fat as if they were stall-fed. There are numbers of herds of Galloways which appear to thrive exceptionally well on the herbage prevailing here.—*C. F. Miles, D.L.S., 1906.*

15. *Southern part.*—There are fairly good wagon roads from Nanton to this township, Nanton being a small but growing town on the Macleod extension of the Calgary and Edmonton branch of the Canadian Pacific railway. It is only about twenty-five miles by the trail which is good for loads almost the year round. Going by the north trail is somewhat longer, but the heaviest hills on the south trail are avoided. The soil is a black loam with generally a clay subsoil. It might produce anything peculiar to this latitude, were the climate favourable. The surface is hilly, partly timbered and scrubby, with willow growing densely in many places, and of such dimensions as to make them suitable for fence posts. Where, however, there are openings, there is generally a luxuriant growth of grasses. The timber, except for fencing and other similar purposes, has no marketable value. There are no hay meadows in the area surveyed by me during the past season, with the exception of a small area along the south boundary of section 3, the hay required by the cattlemen being cut mostly on the uplands. There is good water from the springs which take their rise in the hills. Many of these springs empty into the ponds on sections 3, 9 and 16. These ponds cover quite a large area. They are shallow, with muddy bottoms, and are not easily approached by cattle. They are full of weeds floating on the top of the water, and are surrounded by swamps. The water from the springs is pure and palatable, but in the ponds it is impregnated with decayed vegetable matter. There are no water-powers. The climate is not favourable for the ripening of cereals, and only the hardiest of vegetables or roots arrive at a state of maturity. Oats may be grown for green feed, but will not ripen generally. Potatoes were cut down by frost on the morning of August 4 in three different localities. There is sufficient fire-killed timber for fuel for immediate requirements, and coal may be obtained at no great distance in the foothills. There are no stone quarries, nor were minerals found of any commercial value. Game is becoming scarce; grouse and partridges were seen occasionally, and signs of deer were observed. In conclusion I may say that the climatic conditions are not favourable for general farming purposes, but owing to the abundance of nutritious herbage it is an ideal cattle country. Horses may run at large all the year round and thrive, but cattle require to be fed in severe weather, when a crust has formed on the snow. In such cases it is necessary to have hay provided, more particularly for the younger animals. In ordinary seasons any quantity of hay may be obtained, but in dry seasons irrigation has to be resorted to.—*C. F. Miles, D.L.S., 1906.*

Range 3.

5. The best route for reaching this township is by a wagon trail from Pincher Creek, which runs generally in a southwesterly direction from that town. It can be travelled only in the summer and winter months, the mud being too deep after the road thaws in the spring. During the months of June and July Beaver creek is very high, due to the melting of the snow in the mountains, and in consequence of it being necessary to ford this stream many times, some difficulty might be experienced

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Range 3—Continued.

in going over the road at that season. Occasionally the high water will make the road impassable. The soil in this township consists of black loam or sand with a clay subsoil. A few vegetables can be grown, but the land suitable for agriculture is very limited on account of the mountainous nature of the country. It is suitable for lumbering and mining. The best tracts of timber consist of spruce and pine from twelve inches to thirty-six inches in diameter, but have already been purchased by lumbermen. There is also evidence of the presence of petroleum, but whether it will be found here in paying quantities remains to be determined. There are a few sloughs which produce a coarse hay, but they cannot be said to produce it in any quantity. The country also affords as fine a horse range as can be found in western Canada, there being a good growth of bunch grass on the hills, and a never-failing supply of excellent water. The south fork of Southfork river runs through the centre of the township. It is a large stream and flows at the rate of about five or six miles an hour, with a large volume of water. The low lands adjoining this stream may be flooded at times during extremely high water. The rain and snowfall in this valley is very great. The precipitation might easily amount to one hundred inches during the year. Five hundred horse-power could easily be developed by the construction of a dam in this stream. I spent only parts of the months of October, November and December in this locality and therefore cannot at present, speak positively with regard to summer frosts, but I was told by settlers that they have experienced light frosts during the summer. Stone might be quarried in some places, but the soil is too deep to admit of any being exposed to view. There are quantities of speckled trout in Southfork river averaging about two pounds. There are some fur-bearing animals such as beaver, mink, rabbits, lynx, also a few red deer.—*W. F. O'Hara, D.L.S., 1906.*

6 and 7., Parts.—These parts can be reached by a trail which branches to the south from Crowsnest trail on section 16, township 7. It has been used as a wagon road at some time, but the bridges on it now are unsafe. Pack horses afford about the only means of reaching these sections. The soil of these sections is a sandy loam and would be suitable for grazing. The surface is very broken and mountainous as will be described below. The only hay is the grass on the open side hills. The water is fresh and the supply apparently sufficient. The climate is very changeable, and there are summer frosts. The fuel is coal and wood. Coal has been mined on section 31 and wood can be procured from any section. Plenty of limestone can be quarried on any of the sections. No game was seen. No water-powers occur on these sections, and no traces of minerals outside of the coal mentioned above. Section 19 is rough and broken by mountains. A valley containing jackpine runs southeasterly out of it. Sections 30, 31 and 32 are broken by mountains; a valley runs northerly through sections 30 and 31, the higher end of which is mostly open, but on the north half of 31 it is timbered with young jackpine and spruce. A coal mine has been worked on the north half of 31, and several empty buildings stand in the vicinity. The side hills of these sections are mostly bare rock. Section 32 lies mostly up on the hills; it is very rough and is covered to a great extent with jackpine and spruce up to ten inches in diameter. The central southern part of section 6 is mostly a valley timbered with spruce and jackpine, the rest of the section is very rough and broken. Sections 7 and 8 are very rough and broken; they are mostly covered with spruce and jackpine up to ten inches in diameter. Section 5 is rough and broken in its west half and generally covered with spruce, pine and poplar. Byron creek flows through the northwest quarter section 31 and easterly through the south halves of sections 5 and 6. An old wagon road leading as far as the coal camp passes through the south halves of sections 5 and 6. There has been a railway right-of-way brushed out on parts of sections 6 and 31.—*Lennox T. Bray, D.L.S., 1906.*

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 3—Continued.

8. There is a pack trail leading from Frank, which crosses the mountain running northeasterly through the township. The soil is more or less gravelly though in places a deep rich loam is found. The surface is rough and scrubby in the parts surveyed, as will be explained below. Pine and spruce timber can be got from the ravine leading into the mountains. Hay has been harvested on parts of sections 23, 24, 25, 26, 35 and 36. The water is fresh and there is a good supply. The fuel used is wood and can be procured from some of the ravines leading into the mountains. Stone is plentiful along the mountains. No minerals were found. Those parts of the township lying west of the Livingstone range of mountains can be reached by a wagon road which runs from Frank to Lille. These parts are very rough and have been timbered, but the timber has mostly been burned. No game was seen. The parts east of the Livingstone range of mountains are well adapted for ranching purposes. The climate is changeable and summer frosts occur. Sections 25 and 36 are open and lie mostly up on high bare hills. Parts of the north half of 36 have been improved. Breaking has also been done on the northern part of 25. Sections 23, 24, 26 and 35 are rolling and mostly open but scrubby in patches. Several small lakes occur on the east half of section 35. Sections 2 and 3 are rough and lie mostly up on bare hills. Section 2 is scrubby in its northeast quarter and section 3 is scrubby in its central southern part. Section 11 is rough and broken in its northwest quarter, the remaining quarters are rolling and partly covered with scrub. The southwest quarter of section 14 is very rough, while the southeast quarter is rolling, scrubby land. The southeast quarter of section 10 is rolling and partly covered with scrub. A part of this quarter is cultivated. The remainder of section 10 and the south half and northwest quarter of 15 are mostly open and lie high up on the side hills. The east halves of sections 4, 9 and 16 are very rough and broken and reach to about the summit of the Livingstone range. The east halves of sections 6 and 7 are very rough and broken and covered with standing burnt young spruce. The west halves lie well up on the side of Goat mountain and are very rough. The west half of section 18 is very rough and lies upon the side of Goat mountain. It is covered with burnt young spruce. The east half is rolling and has been mostly cleared. Section 5 is very rough and broken by hills and covered with burnt young timber. The west halves of sections 8 and 17 are very rough and covered with burnt timber in the south, while fine large green spruce and pine cover the northern part of the northwest quarter of section 17 and the southwest quarter of section 20. The east halves of sections 8 and 17 are mostly bare rock and lie well up on the mountains. Soft coal is found in abundance west of the Livingstone mountains. The Frank and Lille railway runs up the Gold Creek valley which is mostly timbered.—*Lennox T. Bray, D.L.S., 1906.*

9. There is a pack trail leading from Frank, which crosses the mountain on section 4, and thence northeasterly through the township. The soil is more or less gravelly though in places a deep rich loam is found. The surface is rough in the parts surveyed and scrubby, as will be explained below. Pine and spruce timber can be got from the ravines leading into the mountains. Hay has been harvested on parts of sections 1 and 2. The water is fresh and there is a good supply. The fuel used is wood and can be procured from some of the ravines leading into the mountains. No minerals were found but prospectors report having found good magnetic iron ore on section 21. Those parts of the township lying west of the Livingstone range of mountains can be reached by a wagon road which runs from Frank to Lille. These parts are very rough and have been timbered but the timber has mostly been burned. No game was seen. The parts east of the Livingstone range of mountains are well adapted for ranching purposes. The climate is changeable and summer frosts occur. Most of the east halves of sections 1 and 12 and the southwest quarter of 1 lie in a valley which is partly covered with scrub. The soil here is good. The south half and

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Range 3—Continued.

central northern part of section 2 and the central part of section 11 are in a rolling valley. Open areas occur in this valley but the surface is mostly covered with willow and poplar scrub. The remaining parts of these sections are very broken by high bare hills.—*Lennox T. Bray, D.L.S. 1906.*

11. The best route for reaching this township is to leave Cowley station, on the Crowsnest branch of the Canadian Pacific railway, travelling north to Oldman river, and along Oldman river through the Gap, to Livingstone river. The soil is a black loam covering sand in the flat valley of Livingstone river. It would be suitable for the growth of cereals except for the heavy frosts in summer. The valley of Livingstone river in this township is a narrow prairie, timbered in the northern portion of the township with pine, small poplar and willow scrub. The pine and spruce is from six to ten inches. In the flat valley there is a good quality of hay. The water is fresh and very clear; the supply is sufficient and permanent. Livingstone river varies from fifty links to two chains and fifty links in width, and from three links to fifteen links in depth. It has a probable average width of seventy-five links and a depth of four links, with a flow of nearly four miles an hour. It seems improbable that the land could be flooded. Livingstone river is available for the development of horsepower. It is nearly a continuous rapid in this township. Power could be developed by the construction of dams. The climate is very dry. The inhabitants say there is frost every week, with the exception possibly of one or two weeks in August. Fallen timber on the mountain and hill sides would supply fuel. On the east boundary of section 7 there is a seam of bituminous coal forty links in width at least. No stone quarries or minerals of economic value were observed. The game consists of a few partridge and prairie chicken, antelope, mountain sheep and bear. Livingstone river is fairly teeming with salmon trout.—*A. L. McLennan, D.L.S., 1906.*

12. The best way to reach this township is to leave Cowley station on the Crowsnest branch of the Canadian Pacific railway, travelling north to Oldman river, and along Oldman river through the Gap, to Livingstone river. It is nearly all sand, suitable for the growth of pine. The surface is mountainous, timbered with spruce, fir and small poplar. On the western portion of the township there is spruce and pine up to ten inches. There is no hay. The water is fresh, and the supply seems to be permanent. Small rapid streams flow into Livingstone river, varying in width from ten to twenty links, and two links in depth, with a strong current. The land could not be flooded. The water-power in these creeks could not be developed. The climate is very dry. The inhabitants say there is frost every week, with the exception possibly of one or two weeks in August. Dry fallen timber on the mountain sides is readily available for fuel. I saw no coal or lignite in this township. The summit of the mountain is composed of sandstone and conglomerate. Hematite in the form of kidney-shaped specimens were found in the bank of Livingstone river. A few partridge and prairie chicken, antelope, mountain sheep and bear were the game seen.—*A. L. MacLennan, D.L.S., 1906.*

17. A good trail from High River reaches this township. High River is a flourishing town on the Calgary and Macleod extension of the Canadian Pacific railway, about thirty miles distant. As my work consisted of subdivision of only parts of the southerly two tiers of sections, my remarks will apply mainly to that part of the township. Generally speaking, the soil consists of a rich black loam, varying in depth from six to eighteen inches along the flats and side hills. On the higher elevations it decreases in depth, and on the summits of the hills rock is frequently exposed. The soil is fit to raise any crops, if climatic conditions are favourable. It is a hilly

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 3—Continued.

township, though there are some fine flats along Pekisko creek, which is bordered by a fringe of timber. The remaining parts are alternately open prairie and willow brush, the former predominating. The timber bordering Pekisko creek is poplar and balm of Gilead up to about eighteen inches in diameter. There are no hay meadows of any account, the hay being principally from the uplands, where the grass grows luxuriantly. This township is well watered by creeks and springs, the principal stream, Pekisko creek, traverses sections 3, 2, 1 and 12, averaging about a foot in depth and about one chain in width. It does not appear liable to flood to any extent. No water-powers are available, or could be developed without great expense. The climate is not favourable for ripening of crops, and the settlers seldom attempt to grow anything, except for green feed, owing to summer frosts prevailing. Fuel might be obtained in the townships to the west, where timber appears plentiful, but coal is found and mined in several places along the banks of Highwood river, in the adjoining townships to the northeast. There are no stone quarries in operation, but the country rock is found frequently exposed in the hills, and might be utilized for building purposes. No minerals of economic value were observed. The only kind of game noticed was prairie chicken, but fish (different varieties of trout) appear plentiful in Pekisko creek. This part of the district is essentially a grazing country, and cattle as well as horses appear to thrive on their pasturage. Most of this land appears to be under lease, so no new settlers may be expected to come in. The pasturage can therefore be more conveniently regulated according to the requirements of those interested.—*C. F. Miles, D.L.S., 1906.*

18. This township is comparatively easy of access by trail from High River, a station and town on the Calgary and Macleod extension of the Canadian Pacific railway. Trails also from the north, from Lineham and Millarville, and from the south from Pekisko offer easy access into this township. The trail from High River has recently been diverted into road allowances and on that account, during very wet weather is somewhat impassable, as it proved to be at the time of my survey (May). The valley of Highwood river extends from one-half to three-quarters of a mile north of the river. There are no bottom lands adjacent to the river, the lowest being about seventy-five feet above the water level. The higher flats form excellent hay lands, those nearer to the river, of a somewhat lower level, afford good grazing; the soil, however, is gravelly and stony. The north boundary runs along a range of high hills. South of the river the soil consists of black loam varying in depth from six to eighteen inches, with generally a clay subsoil. South of the river the land rises gradually for a couple of miles, covered in many places with a more or less dense growth of willow. From here to the south boundary it is more open and hilly, with a gradual descent to the south boundary, affording excellent pasture for both cattle and horses. Along the south side of Highwood river there are some small groves of spruce and also of poplar, the former attaining a diameter of about twelve inches. There is no more timber than is required for the needs of the incoming settlers. There are a few hay meadows, but most of the hay is obtained from the uplands. Highwood river is not easy of access for cattle owing to its precipitous banks. There are numerous springs however, and small creeks, taking their rise in the hills, both from the north and south, containing good water. There are no water-powers available. The climate is not favourable for raising crops to any extent, although potatoes and vegetables have been grown successfully in some of the eastern sections. Frosts, however, prevail during most of the summer months. There is sufficient dead timber, fire-killed, as well as small poplar for fuel, but there is also an unlimited supply of coal now being mined, immediately to the east of this township. No stone quarries were located, although rocks are exposed in various places in the river cutbanks. No minerals of economic value were observed. For game, there are grouse, chickens and rabbits, and

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Range 3—Continued.

the river is well stocked with trout of different varieties. Taking everything into consideration, this township may be considered as excellent for stock-raising, but not for general farming.—*C. F. Miles, D.L.S., 1906.*

19. Fair trails from either High River or Okotoks reach this township. Both these places are stations on the Calgary and Macleod extension of the Canadian Pacific railway, and are within twenty miles of this township. A surveyed trail traverses sections 12, 13, 14 and 23, which, however, is almost impassable. Consequently settlers have adopted a trail following the ridge through sections 12, 13, 24 and 26; this, however, may be closed at any time by incoming settlers fencing their claims. The soil consists of a rich black loam and is well adapted for growing any kind of crops, provided the climatic conditions are favourable. The surface is hilly and rolling, partly prairie, the easterly two tiers or two and one-half tiers of sections being more particularly scrubby. South of Tongueflag creek the township is covered in part with a dense growth of large willow. The remaining westerly part is more wooded; both spruce and poplar are found, reaching up to eighteen inches in diameter. The timber, however, is not in sufficient quantities or of large enough areas to be set apart as timber berths, but should be reserved for the need of settlers. Most of the hay used here is cut on the uplands. Some of the lands along the surveyed trail would produce good hay. The trail is located along a valley, but is almost impassable on account of its swampy nature, and because of the springs that rise in the hills to the east and overflow this valley in places. This township is well supplied with water both by springs and creeks, Sheep river traversing the northwest quarter and Tongueflag creek traversing the southerly second tier of sections. The water is somewhat alkaline. The climate is not very favourable for the ripening of crops; some vegetables thrive and oats are found to ripen in some seasons, but on the whole, this township may be pronounced as being better adapted for stock-raising than for the growing of cereals. A good many cattle are being pastured here already, and with other settlers coming in, the number will be increased. Fences will be erected, which will limit the area for pasture very considerably. It is possible, that with the cultivation of the soil summer frosts may be eliminated, as has been the experience of settlers in the other provinces. So far there is a plentiful supply of fuel within the limits of this township. If this should be exhausted through destructive fires, there is an unlimited supply of coal to the north of this township, and also, according to report, on Sheep river to the west. There are no stone quarries in operation, but rock is exposed in various places along the cutbanks of Sheep river. No minerals of any economic value were observed. With regard to game, mountain grouse and prairie chickens, also rabbits and a few ducks were observed. Deer tracks also were seen occasionally.—*C. F. Miles, D.L.S., 1906.*

20. This township may be reached by a fairly good wagon road from Okotoks, a flourishing town on the Calgary and Macleod extension of the Canadian Pacific railway, about fifteen miles distant. A good wagon road also leads to Calgary by way of Millarville and Priddis, about thirty miles distant. The soil consists of a black loam varying from six to eighteen inches in depth, (the deeper predominating) with clay subsoil. It is suitable for the cultivation of any crops peculiar to the latitude provided the climatic conditions are favourable. In parts, potatoes and other hardy vegetables, as well as oats and barley have been grown successfully. The surface is hilly and rolling, frequently timbered with small groves of poplar and spruce on the northerly exposure of the hills, where it is also generally springy; scrub willow prevails to a greater or less extent on the low lying lands. The timber in a few instances reaches up to twelve inches in diameter. There is, however, no more than is

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Range 3—Continued.

required for the needs of the settler. There are no hay meadows of any extent, much of the hay being made on the uplands. Water appeared plentiful at the time of my survey (June), it having been a very wet spring. The creeks were running and some fine springs were noticed on the hillsides, the water being of a very good quality. There are no water-powers within the limits of my survey. During my stay of about two weeks in this township, there were no frosts, and I concluded that climatic conditions might be more favourable for the raising of crops in the eastern than in the western half. Areas for pasture are becoming very limited, and it will be but a very short time before this township is overstocked. For fuel there is at present quite an amount of standing timber, partly fire-killed, but a good quality of coal is found and mined within a convenient distance in the adjoining townships to the east. There are no stone quarries in operation, nor were there any minerals of economic value observed. A coal seam has been worked in Sheep river in the southerly part of this township, but since abandoned. As for game only a few chickens and partridges were observed. I find that men with families, who came in here with very small means, have arrived at a state of comparative affluence by hard work and economy in a very few years. Their horses and cattle are not roaming at large; they have quite a few head of milch cows, and sell a considerable amount of butter every week, also poultry and eggs, and raise sufficient vegetables for their own use as well as for market in the nearest town or village. They are now living in the enjoyment of the fruits of their labour and enjoy greater comforts than even they knew before they settled here. The female members of the families are even more enthusiastic about their life and interests than the male members. Yet none had to work so hard or suffer the same privations as the old settlers in the one-time backwoods of Ontario.—*C. F. Miles, D.L.S., 1906.*

50. The easiest and by far the best route to reach this township is by the trail leading from Leduc, passing Calmar and Telfordville, and thence westerly across range 2 to the homestead of C. M. David on the southwest quarter of section 12. The trail is good throughout and has been graded from its starting point to Telfordville. Another route from Edmonton by way of Sprucegrove, Stonyplain and Mewassin would also reach this township, but owing to the lack of ferry facilities on Saskatchewan river in this neighbourhood it would serve to no good purpose during the flood season. The northern part of this township, that is to say, the two northern tiers of sections, has been overrun by fire, and is at present covered with fire-killed timber and a second growth of small poplar and scrub. The top soil has disappeared, leaving the clay exposed. Its surface is for the most part heavily rolling. The central zone of this township is partly open, with a few islets of green poplar of eight inches diameter. The soil is of a fairly good quality, consisting of a layer of black sandy loam overlying a clay subsoil and suitable for mixed farming, and at present produces a dense growth of wild peas in the openings. The remainder of this township, except sections 1 and 12, where conditions are more favourable, is of a heavy rolling nature and densely covered with poplar, spruce and balsam of Gilead of a diameter of ten, fifteen and twenty inches, respectively. Lumbering operations have formerly been carried on on the flats of Saskatchewan river in sections 29 and 32, and the licensee contemplates cutting the merchantable timber in the southern part of the township during the course of the winter. This township though not very abundantly provided with natural hay, yet contains numerous small hay marshes scattered throughout the central zone. Numerous small creeks varying in width from two to ten feet and running in ravines of various depths with a permanent supply of good water, are to be found in this township. There are no streams of sufficient capacity to warrant the development of water-power. The climatic conditions are those generally prevailing in northern Alberta. No summer frosts were observed while the

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Range 3—Continued.

survey operations were being carried on (June and July). There is an abundant supply of fuel in every section, consisting of scorched poplar, balm of Gilead and large willow. A lignite vein known as 'the coal arch.' is to be seen in the cut bank of Saskatchewan river in section 29. No stone quarries and no indications of minerals of economic value are to be found in this township. The only kind of game to be seen here is black bear, and this season they have proved very troublesome by interfering with our caches.—*Louis E. Fontaine, D.L.S., 1906.*

60. This township is reached by the Dawson or Chalmer's trail which enters it on section 4 and leaves it on section 30. It is a passable wagon trail but north of Paddle river especially it requires some repairs to be in good order. The bush is too close to it and keeps it wet, muddy and soft all the time. A bridge on Paddle river is needed to avoid delays and risks when the water is high. The soil is a coat of black loam five to ten inches deep over a sandy clay subsoil which is very porous and absorbs water very fast. It is eminently suitable for farming. The surface is rolling. The two northern tiers of sections are mostly covered with small poplar and brush easily cleared. It is an old *brulé* over which fire passed again, last year probably, killing nearly all the new growth. Areas of that light poplar and brush are also found farther south, but on sections 16, 17, 8, 9, 3 and 4 the timber is heavy. Spruce is met with in nearly every section, but towards the north fire has killed the most of it and it is dry. There appear to be large tamarack swamps, on section 22 extending into 27; on sections 24, 25 and 26; at the corner of the adjoining quarters of sections 11, 12, 13 and 14, and a large one crossing the east outline on sections 12 and 13. I would recommend that these be reserved for the preservation of the water supply. The south half of section 16, the north half of section 9 and part of all the surrounding quarter sections are covered with a magnificent growth of spruce such as I have not often seen in this country. I would recommend that this spruce be reserved for the use of the settlers. The timber is sound and straight with an average of three logs before reaching the lower limbs. I would estimate that there is about two to three million feet of lumber in this area. The nearest stream is Paddle river, six miles south. There are a few hay sloughs but none of any extent that I know of. The water is good wherever found, and as there are no large streams in the township there are no water-powers to be mentioned. The climate is the same as in Edmonton. There is enough timber to supply the fuel for a few years, and outside of the northern sections enough timber could be preserved on each section to supply the wants of the settlers for years to come. I know of no stone quarries nor of any minerals of any kind. A large number of lynx were trapped on this township last winter, also some mink and bear. I have seen tracks of moose, deer and timber wolves. There are a few partridge, and rabbits are in abundance.—*Geo. P. Roy, D.L.S., 1906.*

Range 4.

10. The best route for reaching this township is to leave Cowley station on the Crowsnest branch of the Canadian Pacific railway, travelling north to Oldman river, and along Oldman river through the Gap, to Livingstone river. The soil is a black loam, with a sand subsoil in the flat valley of Livingstone river. It would be suitable for the growth of cereals, except for the heavy frosts in summer. The surface of the valley of the Racehorse branch of Livingstone river is prairie with a few spruce, pine, poplar and scrub. The pine measured up to eight inches on the southern slope of the valley. The open prairie of the valley has a good quality of hay. The water is fresh and the supply sufficient and permanent. The size of this stream is one-third the discharge of Livingstone river. The land is not likely to be flooded. This stream is almost a continuous rapid with a good deal of apparent water-power, but it would be difficult to dam the stream. The climate is very dry. The inhabitants say there is frost every week, with the exception possibly of one or two weeks in August. Fallen

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4—Continued.

timber on the mountain and hillsides would afford fuel. In section 23 there is an outcrop of bituminous coal which probably runs north the extent of this township, and from the south edge of the valley appears to continue south. The coal in this township, and in the two townships immediately north of it, seems to lie on a line almost due north and south. There are no stone quarries or minerals. Game consists of a few prairie chicken, partridge, antelope, mountain sheep and bear. The fish in Racehorse river are very plentiful.—*A. L. MacLennan, D.L.S., 1906.*

11. The best route for reaching this township is to leave Cowley station, on the Crowsnest branch of the Canadian Pacific railway, travelling north to Oldman river through the Gap of Livingstone river. The soil is a black loam covering sand in the flat valley of Livingstone river. It would be suitable for the growth of cereals, except for the heavy frosts in summer. The valley of the northwest branch of Livingstone river is a narrow prairie bounded by the mountains on either side, timbered with spruce and pine. The pine is from six to ten inches in diameter, except in the valley of the northwest branch. In the valley of the northwest branch there is a good quality of hay. The water is fresh, and the supply is sufficient and permanent. The northwest branch is a very rapid stream, about one-third the volume and discharge of Livingstone river. The land would not be subject to floods. The northwest branch is practically a continuous rapid, but there is no available horse-power, as it would not be convenient to construct dams. The climate is very dry. The inhabitants say there is frost every week, with the exception possibly of one or two weeks in August. Fallen timber on the mountain and hillsides would supply fuel. In the centre of section 35 there is an outcrop of bituminous coal; which would probably extend to the north and south, through the length of this township. Also in the centre of section 14 there is an outcrop of bituminous coal. There are no stone quarries or minerals of economic value. The game consists of a few partridge and prairie chicken, antelope, mountain sheep and bear. The fish in the northwest branch is abundant.—*A. L. MacLennan, D.L.S., 1906.*

12. This township is similar to township 12, range 3, west of the fifth meridian.—*A. L. MacLennan, D.L.S., 1906.*

22. There is a good trail from Calgary to Priddis post office, a distance of about twenty miles. From there it is about four miles west over a rough, somewhat swampy trail to the east boundary of this township. From Midnapore, a station on the Macleod extension of the Calgary and Edmonton railway, it is about twenty miles. A fair winter trail runs up to about section 18 up the valley of Fish creek, but that portion that is boggy in summer is generally glare ice in winter before the snow falls. The soil generally is a black loam with clay subsoil, but it is frequently stony and rocky on the more elevated places. It produces fine pasture and good hay in the more open parts. For raising crops, I consider the climatic conditions most unfavourable. The surface is hilly and rolling, with but a small proportion of open prairie. The rest of the surface is covered with scrub—willow and second growth poplar—and some timber. The bunches of timber, yet standing, consist of spruce and banksian pine. The most important of these bunches are found on the south half of section 12, the south half of section 2, the northwest quarter of section 11, the east half of section 10, the east half of section 4, the northwest quarter of section 4, the northeast quarter of section 5, the southeast quarter of section 8, the northwest quarter of section 16, the southeast quarter of section 21, the west half of section 15, the northwest quarter of section 16, the southwest quarter of section 14, the southwest quarter of section 11, the southwest quarter of section 22, and the southwest quarter of section 21. Hay has been cut in various places along the valley of the south fork of Fish creek, more particularly on sections 11 and 12, and on sections 17 and 18 on the south side

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4—Continued.

of the creek. This creek enters the township in section 18 and leaves again in section 12, flowing through a valley, which traverses sections 18, 17, 21, 22, 15, 14 and 12. It averages about twenty-five links in width and one foot in depth. Since it rises in the mountains, it contains a good quality of water. Another little stream called Whiskey creek crosses the southern tier of sections through a narrow valley partly timbered and partly covered with scrub. The north branch of Fish creek runs diagonally, southwest through sections 35 and 25. Besides these creeks numerous springs take their rise in the hills, and are the cause of so many swamps. The climate is not favourable for farming purposes, frosts occurring from time to time during the summer months. As far as I could learn, no attempt has been made at cultivating the soil. There is but one settler in this township. He has a house, a stable and some pasture land fenced in. He has some horses but no cattle. There are two winter cow camps, where outside ranchers cut hay and feed it to their young stock. The one situated in the northeast corner of this township I have no personal knowledge of; the other one is situated on the northeast quarter of section 18, where there is a good log house, a large log barn and a small amount of fencing. About a half dozen large hay stacks were seen here. A peculiar looking small animal was also observed here. It appeared to be domiciled under the floor of the log shack, and made considerable depredations at night among my provisions. When caught, it proved to be what is locally called a mountain rat. It had a bushy tail and large, erect, almost round ears. For fuel, any quantity of fire-killed standing timber is available. No indications of coal were observed, and no stone quarries or other minerals of any economic value. Partridge and rabbits appear plentiful, and there are also some grouse. Many deer tracks in the snow were also observed. The deer will probably be exterminated before many more years, as this part of the district is part of the hunting grounds of the Stony Indians. Trout of many varieties are said to be plentiful in the south branch of Fish creek. An Indian pack trail from Morley, a town on the Canadian Pacific railway, situated on the Stony Indian reserve, runs southwest through this township, and then south for quite a long distance. It is not suitable for wheels, but a good sleigh road might be constructed along it for winter travel, when conditions make such necessary.—*C. F. Miles, D.L.S., 1906.*

56. This township is reached by means of a trail which leaves Peace river road in township 56, range 2, opened by the surveying parties who were engaged on the preliminary surveys of the Transcontinental railway. The trail is in a very bad condition owing to numerous muskegs and swamps which have to be crossed and there are no bridges nor log crossways, so that persons teaming over the road have to spend much time brushing to make the trail passable when not frozen. The soil is a dark loam overlying a clay subsoil, and seems to be a good fertile soil suitable for all kinds of crops. The surface is rolling and covered with timber or scrub. Much of the timber attains a good size, poplar running up to fifteen inches and spruce up to twenty inches in diameter, apparently thrifty when not killed with fire. There is some white birch scattered through the poplar. More or less spruce is seen all through the township but the bulk of the timber is in the south half, and west of Oldman lake. About half of the surface has been burned over and a large proportion of the timber is dead and some of it fallen. Fire has recently overrun the north part of the township but has not done as much injury as former fires. There is little hay to be got without clearing the flats and marshy places, but there is some around the south end of Oldman lake and in spots along the creek which joins this lake at the south end. Water is abundant in ponds and small streams tributary to the creek which flows into the lake. All water is fresh and good. There are no millsites nor water-powers available. A small fall could be made by building a dam across the creek in many places, but the water supply would fail in dry weather. The climate seems favourable, with few indi-

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN. •

Range 4—Continued.

cations of summer frosts. Wood for fuel, of the best kind is abundant everywhere, but there are no indications of coal. The township is free from rock outcrop and but few boulders are to be seen. There are no minerals of any description visible. Game is scarce; there are a few bears, wolves and foxes, with an occasional small deer. During spring and fall there are ducks in Oldman lake and some fish, consisting of pike, doré and goldeyes. There are no settlers in the township at present but quite a settlement four miles farther on in Pembina valley locally known as 'Wild Horse valley.' The preliminary survey line of the Grand Trunk Pacific enters this township in section 24, and leaves it in section 35.—*Thos. Fawcett, D.T.S., 1906.*

57. Access to this township is gained by means of a trail opened by the surveyors in charge of the Grand Trunk Pacific railway preliminary surveys, it enters the township in section 5, and leaves it in section 18, following closely the surveyed line of the railway across the southwest corner of the township. The trail when not frozen is in very bad condition. The soil generally is a clay loam except near Pembina river, where it is sandy and the subsoil usually clay. All the elements needed in a fertile soil seem to be present. The surface is rolling to hilly and the whole covered with timber or brush and on that account would scarcely be recommended for settlement. The greater portion would be worth preserving for a timber berth as there is much valuable spruce of considerable dimensions. Two-thirds of the township next the north boundary might be set aside for a timber berth (except sections 18 and 19). There are squatters in sections 6, 7 and 19. For two miles lying north of the south limit of the township, poplar is the predominant timber, with thick scrub and isolated patches of spruce and tamarack. Portions of the township, probably one-fourth of the entire area, have been overrun with fire four or five years ago and much of the timber destroyed. There is excellent spruce in the vicinity of Pembina river varying in size up to 36 inches in diameter, and cottonwood up to forty inches. I would estimate the merchantable spruce at 12,000,000 feet, board measure, besides other valuable timber. There is some hay in sloughs formed through changes in the river bed, but in no large quantities. Water is abundant and good in all parts of the township. The north end of the township is principally muskeg saturated with water to the surface of the ground and boggy everywhere the timber is large. There are no falls on the river or rapids worth noting although the current is strong during periods of high water. Climatic conditions seem favourable, there being no indications of summer frosts or injury therefrom. The wood supply for fuel is everywhere plentiful, but no indications of coal were seen except small fragments washed up by the stream along the banks of the river. No minerals of economic value were seen nor rock valuable as building stone. Game seemed scarce, consisting of small red-deer and occasional bears, foxes and wolves. The river seemed well stocked with fish, consisting of pike, doré and goldeyes.—*Thos. Fawcett, D.T.S., 1906.*

58. The means of access to this township is a trail cut from the Edmonton-Peace River trail some seven years ago by a Mr. Menier, who resides on section 33. The road is in fairly good condition during the dry season of the year. Both clay and sandy soil are found in most sections, with usually a clay subsoil suitable for growing either grain or root crops. The south half of the township is heavily wooded, while the north half is timbered with poplar and scrub or open scrub brûlé. The south half of the township, owing to the presence of several large muskegs or floating bogs, is scarcely suitable for settlement, but contains some good timber, spruce, tamarack, poplar, &c., and might be set apart for a timber berth. There would easily be over 100,000 feet board measure of merchantable timber on each section of 640 acres, or an estimate of 2,000,000 feet would not be too great for the south half of the township. There are a few hay sloughs scattered over the north half of the township, but

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4—Continued.

none of large dimensions. The water is fresh and abundant in ponds and lakes. There are no streams except a few gulches which carry off surplus water in the spring and during periods of flood. Garden produce and grain are grown successfully, as seen on squatters' claims, with no more liability to summer frosts than elsewhere. Wood for fuel, dry poplar, spruce, tamarack, &c., is plentiful. No indications of coal nor minerals of any kind were seen nor any outcrop of rock. Game seemed to be scarce. Ducks settle in the ponds and lakes during spring and fall, but few seem to breed there. Wolves hover around the settlement. Rabbits are plentiful, and supply both wolves and foxes with food.—*Thos. Fawcett, D.T.S., 1906.*

59. Access to this township is open from the south by means of a trail which branches off from the trail crossing township 58, range 4, in section 36, also at the northeast corner of the township, where a branch from Peace river trail enters the township. Both roads are passably good in favourable weather. The soil is generally a sandy loam with subsoil of clay, and is well adapted for producing any kind of crops. The surface is undulating, with some considerable hills, and covered with timber or scrub. The greater part is *brulé* overgrown with brush. Nearly every section contains patches of green timber which escaped destruction when the fire ran over the country. These green patches are usually protected by muskegs which are numerous in all parts of the township. While there is plenty of good timber for all purposes of settlement and some very valuable spruce, yet not enough to justify withholding the land from settlement, as there are portions of every section that can be easily cleared of brush and ground timber and made ready for the plough. Considerable hay may be obtained from marsh meadows, especially after improvement. Water is easily obtainable in all parts and is of good quality. The choice locations, with water as a prime object, are on Paddle river which enters the township in section 6, and after following a winding course emerges in section 13. The stream, which averages a chain in width, is from three to ten feet deep and contains excellent water, and seems fairly well stocked with fish. There are no falls nor rapids worthy of note on this part of the stream. Climatic conditions seem favourable, with few indications of injury from frost. Garden produce was mostly green up to the middle of September. Wood for fuel abounds in large quantities all over the township. No indications of coal or other minerals of value were observed, nor did we see any outcrops of rock suitable for building purposes. Ducks are found in the lakes and ponds during spring and fall; partridges and chickens are present but scarce. Wolves seemed rather numerous, and foxes also make their home here. The greater part of this township is adapted for settlement.—*Thos. Fawcett, D.T.S., 1906.*

60. This township is reached by the Chalmers or Dawson trail which enters on section 25, and then running northwesterly leaves it by crossing the north boundary of section 34. It is fairly good in dry seasons, but in the spring and after the June rains it was hardly fit to travel. The soil is a coat of black loam averaging ten to twelve inches deep over a sandy clay subsoil eminently suitable for farming. The surface is rolling. The eastern half is covered with a new growth of poplar one to three inches in diameter, with bluffs of large size as well as groves of spruce around the edge of the sloughs. There is a sufficient quantity to supply the first wants of the settlers. The western half of the township, especially sections 18, 19, 28, 29, 30, 31, 32 and 33 are heavily timbered with a fine growth of large spruce. About two million feet of lumber could be cut in each of these sections besides seven or eight thousand cords of pulpwood. There is no stream going through this township sufficiently large to drive lumber. Hay sloughs are not numerous but a good quantity of hay could be cut around the lakes in the southwestern part. The water is good wherever found, but there are

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 4—Continued.

no large streams nor water-powers that I know of. The climate is the same as in Edmonton. I have seen no stone quarries nor minerals of any kind. There is sufficient timber on every section to supply fuel for the first wants of the settlers and in most sections to supply the wants for years to come if properly cared for. We have seen tracks of bears and deer. Rabbits are plentiful and lynx are trapped all over the township. Ducks were thick in the lakes, but partridge and chickens were scarce.—*Geo. P. Roy, D.L.S., 1906.*

Range 5.

50. This township is accessible by a good wagon trail from Edmonton via Mewassin. The township presents a very rough appearance owing to the high rough banks of Saskatchewan river valley which passes through it. Owing to this roughness and also to the fact that the black loam covering it ranges in depth only from three to five inches with a subsoil on the higher places of clay and in the valleys of sand, this township is not suitable for agricultural purposes. Moreover the scarcity of hay and the presence of muskegs in the northerly portion are other features which spoil it for the farmer. One commendable feature is the presence of good water though there are no water-powers; another is the beauty of the climate which closely resembles that of the Edmonton district. In the southwesterly portion of the township, spruce timber up to two feet in diameter, and of a second grade quality, is found, a goodly portion of which has been cut and was being cut at the time of the survey. Also throughout the township poplar trees abound which are and will be the chief supply of fuel, though there is a likelihood of coal being discovered in the near future. Regarding stone quarries and minerals of economic values there are none, and the game found is of no consequence.—*R. H. Knight, D.L.S., 1906.*

57. The best route for getting to this township is by means of the Grand Trunk Pacific wagon road which runs from Sion to McLeod river. This trail enters this township in section 13 and runs approximately due west, keeping south of Pembina river as far as the east boundary of section 18 where it crosses over a good ford, and thence keeps along the north bank of the river, finally leaving the township in section 18. The part of this trail south of the river is very hilly and not at all good. From this trail, at Logan's store in the northeast quarter of section 13, where there is a good crossing over Pembina river, a settler's trail runs north to Morris' farm in section 26, from where I cut a road running approximately due north. This road runs as far as the trail from Peavine prairie to Belvedere in the south of township 59, range 5. I also cut another road from Morris' farm in section 26, which runs westerly through sections 26, 27, 28, 29, 20, 19 and joins the Grand Trunk Pacific Railway trail, first described, in section 18. The soil in this township is not first-class, consisting generally of three to four inches of black loam over a hard clay subsoil and can mostly be rated as second class land, suitable for mixed farming. In sections 5, 6 and 7 there is some first class land and along Pembina river, the flats have a rich deep soil, averaging from six to twelve inches of black loam over a sandy loam subsoil, which is suitable for all kinds of crops. The surface is generally undulating in character, and is covered with poplar and spruce, averaging from four to eight inches in diameter. About one-half of this township has been burnt over and is covered with brulé, windfall and willow brush. There is very little timber in this township, but some large spruce, averaging from ten to twenty inches in diameter, is to be found along Pembina river, especially on the south side and in small bluffs all through the township. There are no large hay meadows, but small ones are scattered all through the township. All the water in this township is fresh, and the supply is sufficient and permanent, being furnished by Pembina river which averages two hundred and eighty feet in width, two feet in depth, and has a current of three miles an hour; by Coyote creek which averages twelve feet

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN:

Range 5—Continued.

in width, one foot in depth and has a current of one mile an hour, and by a permanent lake in sections 34 and 35. No land is liable to be flooded. There is no natural water-power available, but Pembina river could be dammed so as to furnish power. The climate is similar to the Edmonton district. Wood for fuel is available on every section. No coal veins have yet been discovered, but there is considerable float coal in the bed of the river and possibly coal will be found in this neighbourhood. There is no stone or mineral. There is not much game, but there are fish in Pembina river, namely, pike, perch and goldeye.—*Reginald H. Cautley, D.L.S., 1906.*

58. There are two routes for reaching this township, viz.: by the wagon trail which runs from Belvedere to Peavine prairie, which is a good trail and runs through the north half of sections 34, 33, 32 and 31 of this township; and by the Grand Trunk Pacific wagon trail which runs to McLeod river and follows the south bank of Pembina river through township 57, range 5, from this trail at Logan's store where there is a good crossing over Pembina river, a wagon trail runs as far as Morris' farm in section 26, township 57, range 5 from which I cut a wagon trail, running practically due north, through sections 2, 11, 14, 23, 26 and 35 of this township to meet the trail first described, in section 1, township 59, range 5. From section 11 in township 58, at the northwest corner of a lake which the trail follows, I cut a short trail running due west, which follows the north boundary of sections 10 and 9 as far as the northeast corner of section 8. The soil in this township is not very good, consisting generally of two to three inches of black loam over a sandy clay subsoil, and would not make first class farming land, although all of it is suitable for mixed farming. The surface is generally undulating in character and is covered with poplar four to eight inches in diameter with some spruce and tamarack four to eight inches in diameter in swampy places. Nearly one-third of this township has been burnt over by bush fires and is covered with brulé and windfall with poplar and willow underbrush. Along Paddle river there is usually a strip averaging a half mile in width of marshy flat, covered with gray willow and willow brush. There is very little valuable timber in this township, although there are occasional large spruce scattered through it. There are several small hay meadows along Paddle river, but none of any size. In the south half of section 25 along a small creek valley, probably fifty or sixty tons of hay could be cut, and there are occasional small hay meadows scattered all through this township. All the water in this township is fresh, and the supply is sufficient and permanent, being furnished by Paddle river, which averages thirty feet in width, two feet in depth and has a current of two miles an hour, and which flows through sections 35, 34, 27, 28, 29, 30 and 31. The water is also supplied by eleven permanent lakes. The banks of Paddle river are very steep cut and average fifteen feet in height and no land is liable to be flooded. No water-power can be developed. The climate is similar to that in the Edmonton district. Wood for fuel can be obtained on every section, but no coal or lignite has been found. There is no stone or mineral and no game.—*Reginald H. Cautley, D.L.S., 1906.*

59. The trail from Belvedere to Peavine prairie, which is a good trail, passes through sections 1 and 2 of this township and then runs approximately due west, keeping about one-quarter of a mile south of the correction line. From this main trail, in the northwest quarter of section 1 there are two other trails branching off; one running approximately north and keeping near the east boundary of the township; and the other running in a northwesterly direction along a creek valley as far as the central meridian which it continues to follow very closely. Both these trails were cut by myself, and run into township 60. The soil in the east half of this township is good, consisting of eight or nine inches of black loam over a clay subsoil and is suitable for raising all kinds of crops; but in the west half the soil is very light, consisting of three inches of black loam over a sandy clay subsoil, and is very stony in

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5—Continued.

places. It would not be suitable for raising crops, but would make a fairly good range country. The surface in the east half of the township is undulating in character, but in the west half it is broken or steeply rolling in character. The whole township was evidently at one time timbered with very heavy spruce, but this has nearly all been destroyed by fire. Now there is windfall overgrown with poplar and willow brush over nearly all the township, but bluffs of spruce and poplar are to be found scattered all over the township. There is not much timber in this township, but small bluffs of spruce averaging from six to eighteen inches in diameter are scattered all over it. There is not much hay in this township, but probably one hundred tons or more could be cut along the big creek which flows through the centre of this township. All the water is fresh and the supply is sufficient and permanent and is furnished by two fairly large streams and six permanent lakes. The two streams are as follows, viz.: Paddle river, which flows through sections 12, 1 and 2, and is forty feet wide, two feet deep and has a current of two miles an hour; a large creek which flows south, through the centre of this township, into Paddle river and averages fifteen feet wide, eighteen inches deep and has a current of one mile an hour. The lakes are situated as follows: in sections 36 and 35; Swan lake in sections 19, 20, 29 and 30; in sections 15 and 16; in sections 17 and 18; in section 7 and in sections 3 and 4. Of these, Swan lake is a very fine lake with deep water and sandy shores and contains jackfish, but the others are shallow lakes with marshy edges. There is no water-power available. The climate is similar to that of the Edmonton district. Wood for fuel is available on every section, but no coal or lignite has been found. There is no stone suitable for quarrying and no minerals have been discovered. There is no game.—*Reginald H. Cautley, D.L.S., 1906.*

60. There are no good trails through this township, the only ones being those cut by myself. There are two ways in which this township can be reached from Belvedere on Pembina river. Firstly, by means of the Klondike (or Swan Hills) trail, from which I cut a wagon road approximately due south to the northeast corner of the township, whence it continues approximately due south; secondly, by means of the Grand Trunk Pacific wagon road to Peavine prairie, which crosses the southeast corner of township 59, range 5; in about the middle of the northeast quarter of section 1, township 59, range 5, there are two trails branching off this main trail, one running due north (approx.) being the continuation of the trail first described, and the other running in a northwesterly direction along a creek valley until it reaches the central meridian of township 59, along which it runs almost due north, although keeping to the west of the meridian after once crossing it; this trail runs as far as the middle of the northeast quarter of section 16, township 60, range 5, but is not as good a trail as the one keeping to the east boundary of range 5. The soil is good as a rule, being composed of four or five inches of black loam over a sandy loam or sandy clay subsoil, and if the land is cleared should prove suitable for all sorts of mixed farming. The surface is very broken in the centre of the township, but as a rule is gently rolling in character and for the most part is heavily timbered with spruce averaging from eight to twenty-four inches in diameter with some poplar, cottonwood, tamarack and birch averaging from six to eighteen inches in diameter. There is a great deal of muskeg and swamp in this township, especially in the northern part, covered with spruce and tamarack averaging from three to eight inches in diameter and there is also considerable land in the north and south parts of the township covered with *brulé* and windfall overgrown with small poplar. There is good spruce timber averaging from eight to twenty-four inches in diameter with some poplar, cottonwood, tamarack and birch timber averaging from six to eighteen inches in diameter to be found in nearly every section in this township, although in the extreme north and south portions it has mostly been destroyed by fire. There is very little hay in

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5—Continued.

this township, the only place in which some was found being on the edge of the two lakes on the east boundary of section 14, where in dry seasons about one hundred tons could be made. All the water in this township is fresh and the supply is sufficient and permanent, being furnished by several small creeks and seven permanent lakes. One of the creeks flows through sections 6 and 5, and is twelve feet wide, one foot deep, and has a current of two miles an hour. The lakes are situated as follows: in sections 34 and 35; in sections 22, 27 and 28; in sections 14, 15, 22 and 23; in sections 13 and 14; in sections 1 and 12, and in sections 1 and 2. No land is liable to be flooded. No water-power can be developed. The climate is similar to the Edmonton district, but more liable to summer frosts owing to the presence of large muskegs. Wood for fuel is procurable on every section. There are no stone quarries, minerals or coal veins. There are some moose and deer.—*Reginald H. Cautley, D.L.S., 1906.*

Range 6.

8. *Sections 1 and 2.*—A narrow timbered valley runs southeasterly through section 1, the timber being mostly jackpine and spruce up to eight inches in diameter. A good creek runs northerly through this valley. The east half of section 2 is broken by a mountain which is covered with spruce timber. A good wagon road leading into Crowsnest passes through section 1. The fuel is wood and can be procured on those sections. No hay occurs on these sections nor any water-powers. No game and no traces of minerals were found. The soil is a sandy clay in the valley, and mostly bare rocks on the side-hills. The climate is very changeable and summer frosts occur. Plenty of limestone rock can be quarried on these sections.—*Lennox T. Bray, D.L.S., 1906.*

50. *Portion south of Saskatchewan river.*—This portion of the township can be reached by a trail recently constructed by lumbermen, which enters the township along the south side of Saskatchewan river. This trail crosses the river about fifteen miles eastward. There is a good trail on the north side of the river which is an extension of the Mewassin trail from Edmonton. The portion of land included in this report is exceedingly rough and broken and is quite unsuited for agricultural purposes. The whole is covered by bush which varies in size up to two feet in diameter, with a scrub undergrowth in all parts of the township. The large timber is chiefly spruce, of a second grade quality. A considerable quantity of this had been cut and what remained was being cut at the time of survey. There is no hay to be seen, but a sufficient supply of good water is to be had. There are many ravines to be found adjacent to Saskatchewan river, all of which contain small streams of good water. There are no water-powers on the above mentioned river, but along its banks can be seen good sandstone. None of this stone has yet been quarried except on a small scale for testing purposes. The stone is good and can be transported down stream very cheaply to the towns and cities located along or near the said river. The climate in this vicinity is good, being about the same as that of the Edmonton district. Frosts did not occur during the time of survey. Minerals of economic value are not apparent, neither is there any game worth mentioning.—*R. H. Knight, D.L.S., 1906.*

50. To reach the work was an easy matter, as a wagon road runs from Edmonton, some seventy-five miles west. The surface of the ground in this township is fairly level until nearing the river, where it is rolling, and contains a fair amount of non-merchantable timber, consisting mostly of scattered poplar—a heavy underbrush of scrub poplar and willow—and a narrow fringe of spruce along the river. The soil would be most suitable for mixed farming, being a clay subsoil with about four inches of good black loam. Hay is very scarce, although good grazing is to be had during

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6—Continued.

the summer. No lakes occur, but water is reached at a short depth; sloughs were shallow and dry. Big creek, in the northwest corner of the township, is the only stream of any importance. It is some twenty-five feet in width and about five feet in depth at high water. It is so tortuous and uncertain in supply that it could not be looked upon as being of any use commercially, for water-power, log driving, &c. The climate as indicated by the growth is good and frost during the summer is only occasionally experienced. Fuel is abundant in the shape of firewood, and the likelihood of coal is shown by the quantity of float in Big creek along which are posts driven and marked 'Coal Claims.' No seams were seen, but it is generally known that there is an abundance of coal in the locality. Along the river running through this township large outcroppings of sandstone were to be seen in several places, some of which are about to be developed. There are no minerals. Game of all kinds is to be had, from moose to prairie chickens.—*A Driscoll, D.L.S., 1906.*

51. *Southern part.*—This township is easily reached by a good trail from Edmonton via Mewassin. The portion of land herein reported upon is quite level, but yet is of little value in the near future for agricultural purposes, on account of the numerous swamps and muskegs. These swamps and muskegs are generally covered with small spruce timber up to six inches in diameter, which is frequently dead. The higher and drier portions of land have upon them a growth of poplar up to six inches in diameter, with an undergrowth of willow scrub. Hay is scarce, so also is good water, though there is plenty of surface water of a poor quality obtainable from the swamps. The only fuel consists of the wood mentioned above, but undoubtedly there is at a moderate depth large coal areas which are common to the surrounding country. There are no stone quarries, neither are there apparent any minerals of economic values. There are no water-powers. The game in this portion of the country is of no consequence.—*R. H. Knight, D.L.S., 1906.*

55. The township is crossed by the road from Lac Ste. Anne to Paddle river. I have not travelled over the road, but I hear that it is hardly in good enough condition to allow wagons to go over it. The soil consists generally of black loam with a subsoil of clay or sandy clay. Stones are found only in a few pits. The soil is very good for farming. Almost all the quarter sections would rate either as class No. 1 or 2. The township is covered with poplar and willow. There are a few open spots in the eastern part. Spruce is scarce. There is no timber of consequence in the township. Jackpine is found only in a couple of spots. Spruce is found in several places, but only in small quantity, and always mixed with poplar. Most of it is less than 9 inches in diameter. As the township is timbered there are but few spots where hay is found. On sections 9 and 21 some hay could be made, though not many tons. The water is not alkaline. In some lakes (Prefontaine and No. 2) it is not fit to drink. There is no stream of importance. The biggest creek comes from the southeast and empties into lake No. 2. No water-power is available. The climate is something like that of Edmonton, I presume. The coldest recorded was 49° below zero, on January 26th, 1906. The fuel most readily available is dry wood. It is quite plentiful. There are no coal veins known to me. There are no stone quarries or minerals. Deer and bear would probably be found in the township.—*Raoul Rinfret, D.L.S., 1905.*

56. The township is crossed by the road from Lac Ste. Anne to Paddle river. I understand that it is hardly in good enough condition to allow of wagons to travel over it. The soil is very good for agriculture. Three-fourths of the sections would rate as class No. 1. Gravel and stones are met with occasionally in the pits. The soil consists of black loam with a subsoil of clay or sandy clay. The township is well covered with timber which consists of big poplar and willow. There is birch

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6—Continued.

scattered here and there. Spruce is scarce in the township. Some is seen along Deep creek in some spots, and in the southeast corner of the township. There is very little hay to be made. The only place where hay is found is between lakes Kelly and Hope, and in small quantity. The water of lake No. 1 is not fit to drink. The only creek of importance is Deep creek, which is the outlet of lake No. 1. There is another creek running northerly in the northeastern part of the township. Deep creek, on the east boundary of section 25, township 56, range 7, is 25 links wide. It was dry in January. The climate would probably be like that of Edmonton. The coldest recorded by me was 49° below zero. Dry wood is very readily available. There are no stone quarries or minerals. Deer and bear would probably be found. The township is fairly level, except the western part. The Grand Trunk Pacific is expected to pass a few miles north of this township.—*Raoul Rinfret, D.L.S., 1905.*

57. This township can be reached by the road running to McLeod river, which crosses range 6 approximately along the correction line, and by going from there southward across township 58 by our road. It can also be reached by the south branch of the McLeod road, which runs along Pembina river, but this road across range 5 is practically impassable. The soil as a whole is good, especially along Pembina river, where it is black loam top soil and sandy loam subsoil. On the high ground there is a clay subsoil. It is suitable for raising grain and vegetables, and some of the new settlers obtained good crops of both this season. The surface is level as a whole, though there are various well-defined valleys, but the change is not abrupt except in places along Pembina river. The surface is completely wooded. Originally the timber was spruce of large size, but this has been burnt to some extent, and it is now mainly covered with poplar three to twelve inches in diameter. The original timber shows either as standing dead timber, or as thick deadfall, and making a road through it entailed a great deal of work. South of Pembina river the timber is spruce, poplar and tamarack, most of which is of small size, and it is principally green. There are a few meadows along Pembina river and also on the high land, but hay is scarce. The water is fresh and wholesome. There are various small ponds and minor creeks, but the latter dry up in the fall, and at that season it was difficult to find water. Pembina river is the permanent stream. It is about four chains in width and from three to twelve feet in depth, depending upon the season, and it has a current of about three miles an hour. It runs in a well-defined valley, and I judge that the adjacent land is not flooded, or if so, it is only temporarily from ice jams. No water-powers exist, but they could possibly be developed along this river. The climate is favourable, and no summer frosts were observed. Timber fuel is plentiful, but no coal was discerned, nor were other economic minerals observed. Ducks, rabbits and grouse are plentiful, and the fishing in Pembina river is good.—*Thos. Drummond, D.L.S. 1906.*

58. The best route for reaching this township is by a road leading to McLeod river which crosses range 6 approximately along the correction line, and thence southward by a road cut by my party. The soil consists of the usual covering of black loam, and the subsoil is usually clay, except when it is a sand or sandy clay, which is presumably underlaid by the clay. The township is covered with timber, which is somewhat small and scrubby. As a whole it is poplar, but spruce occurs in clumps, and is scattered through the poplar. There is also quite a lot of meadow land covered with thick willow. Several good hay meadows were found in this township, notably around Twin lakes and in sections 15 and 16, and along Paddle river and the various creeks. This is practically all overgrown with willow, but by clearing, a large area of good meadow land could be obtained. A peculiarity of this land is its hummocky nature, which is probably due to the action of frost and heat in forming cracks in the clay soil. The grass is locally known as blue joint and it is of good quality. It

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 5—Continued.

might be added that cattle do well in this country, but it is apparently not so favourable for horses. This township is suitable for ranching. There is an abundance of good water throughout the township. There are quite a number of large lakes and several large streams of a permanent character. Paddle river is the principal branch of Pembina river. It traverses the township in a northeasterly direction, is about sixty feet in width and from two to twelve feet in depth, and has a current of about three and one-half miles an hour. Southeast of this stream and about one-half mile distant from it is a parallel stream which I consider runs in an old bed of Paddle river. It is about seventy feet in width, from five to ten feet in depth, and has very little current. A creek joins Paddle river from the north side in section 15; it is about twenty feet in width and from three to five feet in depth and has a current of about two and one-half miles an hour. One branch of it runs through Chip lakes, and the south branch runs eastward from the adjoining township. Along all of these streams the adjoining meadow land is flat and low, and it is probably flooded more or less in the spring freshet, but to what extent and depth I cannot state. Wood fuel is plentiful everywhere, but coal was not discovered, nor were other economic minerals observed. Ducks, geese, grouse and rabbits are plentiful, and there are pike and other fish in the streams, and in several of the lakes.—*Thos. Drummond, D.T.S., 1906.*

59. The route to reach this township is by a road going to McLeod river. It is in bad condition, as it crosses various muskegs and streams. To make it passable I had to corduroy several muskegs, and build various bridges, one of which crosses Paddle river, and has a span of about sixty feet. This road crosses range 6, approximately along the correction line, and our own road runs northward from it across the township. The soil is very good, and it is suitable, I should judge, for raising the various grains and vegetables. It consists of black loam top soil and a clay subsoil. This clay land, I judge, would make good wheat land, as there is a rank growth of peavine in the poplar land. The surface is covered with timber, spruce, tamarack, birch and willow. One portion, i.e., the greater part of sections 16, 17, 18, 19, 20, 21, 28, 29 and 30, is included in timber berth No. 1191, and consists of spruce of large size and good quality. Most of the remaining part of the township is covered with poplar, three to ten inches in diameter. The surface is rolling, and in many places quite rough and hilly. Swamp hay of good quality, and in considerable quantity can be obtained along the shores of Thunder lake and Twin lakes, and also along a creek which runs in a southeasterly direction, across the southwestern part of the township. The water is quite fresh and wholesome. There are many lakes, some of which are of considerable size, in which the supply is permanent, and there are also various creeks, which are not as permanent in the fall of the year. Some of the meadow land along the creeks is probably flooded for a short time in the spring, to a depth of perhaps one foot. No water-power exists, and none could be developed. The climate seems favourable, and no summer frosts were observed. Wood fuel is plentiful everywhere, but no coal or other economic minerals were discovered. The various waterfowl are plentiful, also rabbits, and some of the fur-bearing animals, and in the fall of the year Indians killed three moose in the township.—*Thos. Drummond, D.T.S., 1906.*

60. The best route to this township is by a branch of the road leading to McLeod river, which approximately follows the correction line across range 6, and thence northward by a road cut by my party. The soil is good. It consists of the usual covering of black loam, with a subsoil of sandy clay, underlaid at a greater depth, presumably, by the usual clay subsoil of the country. The timber is heavy, however, and there are quite a number of muskegs. The soil is suitable for growing the various grains and vegetables. The surface is fairly level as a whole, except along the northern part of the township, where it becomes somewhat rugged and rough, as it rises to the height of land, between Athabaska and Paddle rivers. Timber con-

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 6—Continued.

sisting of spruce, tamarack and poplar, is found all over the township. The spruce is of large size; many trees two to three feet in diameter were cut, and it is of good quality, straight and clear of branches. Timber berth 1191, a survey of which has been made by the owners, includes a large portion of this township. In the remainder of the township the timber has been destroyed by fire, and it is now more or less overgrown with poplar. Hay is very scarce throughout the township. A little can be obtained along a creek which traverses the southern part of the township. Apart from this we could find none, not even feed for our horses. The township is fairly well supplied with fresh water by various lakes of considerable size, and by several streams. The lakes are permanent, but the creeks practically dwindle to nothing in the fall and winter. There are no water-powers and none could be developed. The climate seems favourable, and no summer frosts were observed. Timber fuel is plentiful and can be procured everywhere, but no coal was discovered. No minerals of economic value were found: Moose and bear seem plentiful, and the same remarks apply to geese, ducks, rabbits and grouse, and the various fur-bearing animals.—*Thos. Drummond, D.T.S., 1906.*

Range 7.

56. This township is covered with a heavy growth of timber, consisting of poplar five inches to twelve inches in diameter and spruce four inches to fifteen inches in diameter, except parts of sections 31, 32, 33, 34, 35, 36, 28 and 27, over which the fire has run, leaving only a few bluffs of green poplar, with a new growth of small poplar and willow brush. These are good farming sections. The balance of the township is too thickly wooded for immediate settlement. A pretty good wagon trail from Lake St. Anne to Paddle river crosses sections 31, 32, 33, 34, 26 and 25. Pembina river flowing north crosses sections 4, 9, 16, 15, 22, 27, 23, 26, 35 and 36. This township is well watered by numerous creeks. The land is about level on the west side of the Pembina and rolling on the east side. It is a good second class land. There is good fish in the river, but I did not see any game in the township. There are good seams of coal all along the Pembina, which is also running a little gold.—*A. Michaud, D.L.S., 1905.*

57. *East and north outlines.*—Pembina river is crossed in section 1, along which there are small areas of prairie to the west. Sections 1, 12, 13, and the south half of section 24, are densely timbered with poplar from four to eight inches in diameter. The height of land between Pembina and Paddle rivers is about the centre of the north half of section 12. From there the land slopes gradually to the northwest. The bottom lands are reached about the middle of section 24; from here to the northeast corner of section 36 the land is low and wet with willow scrub and grass sloughs. Paddle river, a stream about thirty-five links wide, three feet deep, with slow current and mud banks from six to eight feet high, flows in a northeasterly direction crossing the east outline about the middle of section 25. The north outline is mostly on the south slope of a range of hills separating Paddle river from another stream flowing across township 58. The north boundary of section 36 is swampy, with willow scrub and sloughs. The east half of section 35 is covered with green poplar, from three to six inches in diameter; the remainder of the outline is rolling and runs through old *brulé* grown up with poplar and willow scrub. An old pack trail is crossed at the northwest corner of section 33. The soil is six inches of loam over clay, with some stones in places. No coal or lignite veins were found. No stone quarries and no minerals of economic value were observed. The game was bear, rabbits, ducks and a few partridge.—*Hugh McGrandle, D.L.S., 1906.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 7—Continued.

58. This township is reached from Edmonton via Lac Ste. Anne, by a trail which enters the township at the southeast corner of section 5, and which is in very bad condition and almost impassable for wagons in wet weather. I cut a new trail around a number of swamps. Another trail via Belvedere post office crosses the north end of the township. This trail is also in bad condition, following hay sloughs, along creeks, and around small lakes. The soil in this township is mostly a clay loam over clay, but on the top of some of the ridges there is sand and gravel with some large stones; it is suitable for mixed farming. The surface is rolling to hilly, and is covered with a second growth of poplar and willow scrub, and is dotted over with small swamps of spruce and tamarack from six to ten inches in diameter. There is one or more of these swamps on almost every section. The southwest half of the township has no standing timber, except in the small swamps mentioned above, and a few small clumps of poplar on the south half of section 6. The northeast half of the township is dotted over with clumps of dead poplar and spruce. Along the east boundary is a considerable quantity of standing dead spruce from eight to ten inches in diameter. The greater part of section 1 is covered with green poplar from four to six inches in diameter, with some spruce from six to eight inches in diameter, and on the northeast quarter of section 31 is some large green spruce, poplar and cottonwood from ten to twenty-four inches in diameter. The whole surface of this township is covered with fallen timber, with the exception of patches where the timber has been nearly burned up. This is the case on portions of sections 7, 8, 17, 18, 20, 21 and 14. The standing timber, with the exception of that on the northwest quarter of section 31, is fit only for settlers' use. A creek from fifteen to twenty links wide, and from one to two feet deep, meanders through the centre of the township, from west to east. The north branch enters the northwest quarter of section 30, and the south branch enters the southwest quarter of section 18; the two branches join in the southeast quarter of section 30, and flow in an easterly direction through sections 29, 20, the southwest corner of 28, 21, 22, the southwest corner of 23, 14 and 13, leaving the township at the southeast quarter of section 13. The only hay seen in the township is on the southeast quarter of section 1, and along the valley of the above mentioned creek, where a considerable quantity of coarse slough hay could be put up. On the high land is a luxuriant growth of wild vetches which is excellent feed for stock until the snow falls. The water is slightly alkaline, but I think, sufficient and permanent. The above mentioned creek is supplied from springs, and there are several small ponds throughout the townships. There are no water-powers. The climate is fair; rather wet this summer, with light summer frosts, but not severe enough to harm early crops. Good potatoes were grown in the township this season. Wood for fuel is available on almost every section. There are no stone quarries. No minerals of economic value were found. Very little game of any kind was seen, except rabbits and ducks in season.—*Hugh McGrandle, D.L.S., 1906.*

59. *Part subdivision.*—This township is reached by the wagon trail from Edmonton, via McDonald's crossing on Pembina river. This trail crosses the north end of township 58, range 7, west of the fifth meridian, and is rough and in bad condition and almost impassable in wet weather, as it follows a chain of sloughs along creeks and small lakes. The soil is about six inches of sandy loam and stone over clay, suitable for grazing after the timber is removed. The surface is gently rolling and covered with heavy timber, consisting of spruce and cottonwood from ten to thirty inches in diameter, also some white birch. On the south half of section 31, and extending into 30, is an old *brulé* and windfall grown up with poplar and willow scrub. Sections 1, 2, 3 and 12 have been burned over lately, and there is now only small patches of green timber left on these sections. The township is watered by several small streams of good water, but the supply would not be sufficient and permanent in dry seasons.

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 7—Continued.

There are no water-powers. No minerals of economic value were seen. The game consists of moose, bear, rabbits and partridges. I would recommend this township for a timber berth, with the exception of the sections named above; in fact it was surveyed for a timber berth a year or so ago.—*Hugh McGrandle, D.L.S., 1906.*

Range 8.

58. *East outline.*—This township is reached by a wagon trail from Edmonton via Belvedere, entering the township near the northeast corner of section 25. This trail is rough and in bad condition, and would be almost impassable in wet weather. There is also an old pack trail (along which I took wagons) branching from the Lac Ste. Anne and McLeod river trail at Paddle river crossing and entering this township in section 13. The soil is a light clay loam from eight to twelve inches over clay, suitable for mixed farming. The surface is rolling and covered with small poplar and willow scrub, and a few small swamps of spruce and tamarack. The scrub and timber in this township is mostly all fire-killed, and another fire or two would convert a good portion of it into prairie, especially sections 12 and 13 and westward which is now called Peavine prairie. There is no timber of any value in the township except on section 36 which is covered with green spruce, poplar and cottonwood from ten to twenty-four inches in diameter. I saw no hay lands, but the surface is covered with a luxuriant growth of wild vetches. The northern portion is well watered by springs or small creeks of good water. There are no water-powers. For fuel there is a good supply of poplar and spruce in the northern portion of the township, and some small bluffs scattered over it. No stone quarries and no minerals of economic value were found. The game is bear, rabbit, sandhill crane and a few partridge.—*Hugh McGrandle, D.L.S., 1906.*

59. *East outline.*—This township is reached from the wagon trail crossing the north portion of township 58, range 7. The soil is a sandy loam over clay and stones, and is rated fourth class, with the exception of section 1 which is rated third class. The surface is rolling and covered with heavy timber consisting of spruce and cottonwood from ten to twenty-four inches in diameter, and poplar, balsam and birch from six to ten inches in diameter. There is no hay. Water is scarce. A few small creeks run through the township, but they are dry in a dry season. There are no water-powers. Wood is plentiful for fuel, but no coal or lignite was seen. No stone quarries and no minerals of economic value were seen. The game consists of moose, bear and rabbits.—*Hugh McGrandle, D.L.S., 1906.*

60. *East outline.*—This township is reached by pack trail along or near its outlines, from the wagon trail crossing the north end of township 58. An old pack trail crosses the east boundary of section 13, and appears to run parallel to Athabaska river which crosses the line at the northeast corner of section 25, and flows in a northeasterly direction through section 31, range 7. The soil is a sandy loam over stony clay, would rate fourth class, and is only valuable for its timber, or for grazing after the timber is removed. The surface is rolling, and very broken near the river, and is covered with heavy timber from ten to thirty inches in diameter, consisting of spruce, cottonwood and poplar. There is no hay. The township is well watered by small streams and ponds and Athabaska river. There are no water-powers. There is plenty of wood for fuel, but no coal or lignite was found. No stone quarries and no minerals of economic value were observed. The game consists of moose, bear, deer, rabbits and ducks, and fish in the small lake on section 1.—*Hugh McGrandle, D.L.S., 1906.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 11.

26. *Western part.*—A trail runs from Banff to lake Minnewanka traversing this area. This trail is always in good condition. The soil is rocky and gravelly, suitable only for grazing. The surface is covered for the most part with brulé and a thick growth of small jackpine. On sections 30 and 31 there is a considerable quantity of spruce as large as eighteen inches in diameter. This occurs in small bunches throughout both sections. There is no hay. The water is all fresh with a permanent and sufficient supply. Cascade creek will average in low water one-half chain wide, one foot deep and a velocity of six feet per second. There is no danger of floods. Water-powers could be developed on Cascade river, but it would require a long high dam with great danger of washouts. Summer frosts were observed every month during the summer. The climate is changeable but owing to the elevation very healthy. Both wood and coal are abundant in the township. Bankhead town and mine, belonging to the Pacific Coal company, are situated on section 19. Limestone boulders and ledges are found all over the district. None is quarried, however. Coal is the only mineral found. Mule deer, coyotes, mountain lion and bear are found in this township. No birds were seen, such as ducks or geese. The sections are underlaid with coal which is being mined by the Pacific Coal company. The coal mined is a rather inferior anthracite but gives very good satisfaction for domestic purposes. The coal company have extensive shafts, tipple, &c., and are especially well equipped with compressed air locomotives for speedy handling of cars, &c.—*C. C. Fairchild, D.L.S., 1906.*

27. *Sections 6 and 7.*—These sections are traversed by the Cascade river pack trail and are only accessible by pack or saddle-horse at present. There is little or no soil in the township. These sections are generally covered with spruce and jackpine averaging eight inches in diameter north of Cascade river and west of the Cascade trail, and with brulé and small jackpine on the balance of the township. There is no hay. There is an abundance of fresh water in Cascade river and numerous springs and creeks flowing into it. There is no suitable water-power owing to the shallow nature of the river and danger from anchor ice. Summer frosts are frequent. The climate is healthy. Coal and wood may both be procured on the sections. There are no stone quarries. Coal is the only mineral found. Deer and sheep were seen, also coyotes and mountain lions.—*C. C. Fairchild, D.L.S., 1906.*

Range 12.

26. *Part.*—This work lies contiguous to the Banff-Lake Minnewanka trail on the east side of Cascade mountain. To get into the sections on the west side of Cascade it is necessary to go in either over Stony Squaw mountain to Fortymile creek and thence along an old hunting trail up the valley between Cascade and Sawback mountains, or to go up the Cascade river trail to near the north boundary of township 27, range 12, and thence up a canyon between the two northerly peaks of Cascade mountain into the same valley between Cascade and Sawback mountains. I cut this trail out sufficiently to get through but expect fallen timber will soon fill it in again. This trail is on an average of one and a half miles from any of the lines surveyed in township 26, range 12, and these lines can only be reached on foot after a stiff climb. The portion of this township subdivided consists of the main part of Cascade mountain, and many of the section lines are wholly or in part inaccessible. There is little or no soil in the township, nearly all the surface being rock. The east side of the mountain, up to an elevation of 6,500 feet, is covered with spruce and jackpine averaging one foot in diameter, interspersed with brulé and thick small jackpine. There is no hay. There is plenty of good fresh water in the numerous springs and small creeks which run down the sides of the mountain, disappearing and reappearing at irregular intervals. There is no danger of floods except from snowslides. There are many miniature falls, some

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 12—Continued.

five or six hundred feet high, and the streams are all rapids and falls, but the volume is not sufficient for power purposes. The climate is healthy and bracing and frosts were observed every month, and when in high places on the mountains every day of summer. There is plenty of both coal and wood on the mountain. The Pacific Coal company's tunnel, I believe, runs under the mountain into this township. There are no stone quarries at present. Coal was the only mineral found. It outcrops along the small creeks in various places on the east face of the mountain, which has all been prospected. Mountain sheep are quite plentiful on Cascade mountain, and a few mule deer were seen, also two bear (grizzly), one mountain lion, numerous coyotes, but no mountain goat were observed. A few ptarmigan and rabbits were also seen.—*C. C. Fairchild, D.L.S., 1906.*

27. This township is reached by a pack trail known as the Cascade trail from Banff. This is a fair trail for a mountain trail. What little soil there is along Cascade river is suitable for grazing. The surface is generally timbered in the southeast part. The balance of the river valley is covered with burnt timber in a good state of preservation. The timber is all of spruce or jackpine and averages eighteen inches in diameter for the most part. There is no hay. There is plenty of fresh water obtainable in Cascade river and its numerous small branches. Cascade river averages one chain wide, two feet deep with a velocity of five feet per second. There is little danger of flooding. Considerable horsepower could be developed by the construction of dams, but anchor ice and liabilities of flooding due to snow slides, etc., would make the economic value of the water-powers doubtful. Frosts were observed every month, but the air is bracing and the climate healthy. There is plenty of both wood and coal in the township. The coal outcrops in fourteen different points on one stream in sections 1 and 12. These are exposed by prospecting work and seem a part of the same seams as are being mined at Bankhead. There are no stone quarries in the township. There are no minerals besides coal as far as I know in the township. Sheep, deer, bear, coyotes, mountain lion, porcupine, rabbits, marten, mink, partridge and ptarmigan were seen in this township.—*C. C. Fairchild, D.L.S., 1906.*

28. *Sections 3, 4, 9, and 10.*—These sections are reached by the Cascade river pack trail from Banff, which is a very good mountain trail. There is little soil in the township, that being clay loam and suitable only for grazing. The surface is generally covered with heavy brulé or dry standing spruce and pine averaging eighteen inches in diameter. This size is reduced as you ascend the mountains and entirely disappears on the tops. There is no hay. There is plenty of good fresh water in Cascade river and small tributary streams. The river averages one chain wide, one foot deep with a velocity of five feet per second. Water-power could not be economically developed owing to anchor ice. None of the land is liable to be flooded. The climate is good. Summer frosts were observed every month. Wood is plentiful on these sections. No coal veins were seen. There are no stone quarries. There are no economic minerals as far as I know. Bear, deer and sheep were seen in the township.—*C. C. Fairchild, D.L.S., 1906.*

Range 14.

76. The south third of this township is at present heavily timbered with poplar and spruce from four to sixteen inches in diameter, and the land is high and quite rolling. Where it adjoins Buffalo bay, an arm of Lesser Slave lake, it falls in terraces about a hundred feet to the beach near the shore. The Salt Prairie Settlement survey covers a large part of the prairie in this township, but outside of it there are sections 36, 35, 25, 26, 22, 23 and 24 and that part of the township north of the settlement sur-

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 14—Continued.

vey which have prairie spots and light timber and windfall easily cleared. The centre portion of the subdivision rises towards the south and east to the rolling heavily timbered land. There is a large spruce swamp on sections 18, 19 and 20, which the fire ran through this summer, uprooting and falling the timber in many places, and there are other smaller muskegs on sections 22, 23 and 26. The several branches of Salt creek become one in section 27, and it flows with a current of about two miles per hour and has a depth of from four to six inches and a width of twenty feet. It runs through a valley seventy-five feet deep and from five to fifteen chains wide to section 21, where it leaves the valley and is within its own banks, often overflowing them, until it reaches Buffalo bay near the southwest corner of section 18. There are three good wooden bridges over it, one in section 18, one in section 17 and another in section 21, all built by private means. The soil, which is black and sandy loam on clay with some sand and sandy loam, is generally good, and grass grows luxuriantly. There was only one squatter living in this township at the time of the survey, but improvements have been made on the northeast quarter of section 34, there being a house, a stable and five acres of breaking; also on the northwest quarter of section 17, on which a good log house is erected, besides a stable and some breaking. The meridian between sections 20 and 21 ran through the improvements made by the only squatter living on his claim, on which he had a house, stable and several acres of breaking. Where crops are growing this season they look so well I think it will not be long before there are numbers of settlers here, in fact before leaving the district several had taken up their residence. Timber, except on sections 13, 14, 15, 16 and 17 and the south third of the township, is of very little value except for fuel. Some good spruce and poplar for building purposes may be got on these sections. Water in Salt creek is good for general use, but I am told that where wells are sunk there is quite a strong mineral and in some cases saline taste. No rocks or stones were seen except a few rolling stones in some sections. The wagon road from Lesser Slave lake to Whitefish lake runs partly in the settlement survey and partly in the township, and since the survey was made I have driven over a road lately cut with the aid of government money north from the village through sections 5, 8, 16 and 21 and crossing Salt creek at the bridge on section 21. This road being on high land is intended to be used when the freshets flood the one usually travelled around the shores of Buffalo bay.—*Henry W. Selby, D.L.S., 1906.*

77. *South part.*—This township is composed of high rolling country of varying character, but the portion subdivided is nearly all good for farming purposes. The north one-third is at present not suitable for farming, the west portion being largely a spruce muskeg and the easterly portion very rolling with some sand hills covered with a growth of timber of little or no value. Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14 and 23 are composed of good prairie land, the southeast part containing bluffs of small timber, poplar and willow. Good water can be had on nearly all of these sections. They are suitable for mixed farming and stock-raising. Grass grows quite luxuriantly and it is quite frequently made into hay by those living near by. The soil is four to twelve inches of black loam or clay. There are no settlers in this township, but some breaking has been done and a fence built on section 2 and section 3. Both of these are sure to make good farms. The remainder of the township is covered with poplar bush and scattered spruce with willow brush along the creeks and sloughs. Two branches of Salt creek pass through these lands, but there is very little saline taste to the water. The wagon road from Lesser Slave lake to Whitefish lake passes northerly through this township. It is my opinion that this township will be settled, it having the advantages of good soil, water, plenty of fuel, a good wagon road to enable settlers to reach the township, close proximity to the village of Lesser Slave Lake where hay and grain can be disposed of, while the danger from summer frosts will be no more than other parts

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 14—Continued.

of the country where the farming is successfully carried on. Moose and caribou tracks were observed but scarcely any other game.—*Henry W. Selby, D.L.S., 1906.*

Range 15.

75. East boundary.—This line was run on the ice because its course lay over so much water that it could not be done in the warm weather. Its north end is in Buffalo bay and in running south keeps a short distance west of the main outlet for nearly three miles, where the main land is again reached and a connection made with the survey of the Sucker Creek Indian reserve, No. 150a. The land along this line is not suitable for farming, but the township west is composed mainly of farming and meadow land. Thousands of tons of hay have been cut on these meadows and hundreds of horses range here every season.—*Henry W. Selby, D.L.S., 1906.*

76. This land may be conveniently divided, for the purposes of description, into the north and south halves. The north half, from a height of probably two hundred and fifty feet near the twentieth base line, lies with a general slope towards the south and southeast, where the south half, slightly higher than the waters of Buffalo bay, is met. Parts of sections 7, 18 and 13 being on the high land should not be included with the south half but as they lie mostly within the settlement survey, need not be affected by this division. All the sections north of the settlement survey although heavily wooded with poplar up to twelve inches in diameter, will make beautiful farms when cleared. And as settlement takes place and this wood is cut fires will make prairie land of it. Water was found only in the creeks running in coulées forty feet to fifty feet deep on sections 32, 33, 34 and 27 and this very strongly impregnated with alkaline or mineral taste, evidently fed by springs or underground currents. Springs were noticed on sections 18 and 19 in the settlement, the water of which though tasting of the mineral, was not so strong as in the creeks. Where wells have been sunk the water is quite strong for a while but improves on being used regularly. Wash creek, coming from section 32 and entering the marsh alongside of Heart river in section 22, has a rapid current. It does not average a depth of two inches and a width of two feet and apparently is fed by springs. It flows in a coulée fifty feet deep to the centre of the Indian reserve. Where the banks of the coulée end it has cut a channel and at high water several channels are running. I saw it in June near my camp on section 28 four feet deep and twelve to fifteen feet wide. This was the effect of only two days' rain, and it remained like that for three days before gradually subsiding. It can be imagined what would be the result upon South Heart river, which is only a little over a chain wide and seldom over two feet deep, with a current of about two miles per hour and which winds its way across the south half of this township. Several channels have been made through this low land the soil of which shows that it has been deposited by the ever recurring freshets and which had gradually risen until now the greater part of the low land remains dry at all times, but thousands of acres are still flooded by the sudden pouring of this volume of water into Buffalo bay. These old channels, or partly used channels are in places like rivers without any current, with bars in them where at low water one can cross dry-shod and at time of freshet with the current setting up stream carrying a canoe as fast as it will ordinarily downstream in the main channels. There are now at low water four mouths to South Heart river, and they are emptying such a quantity of silt or deposit into Buffalo bay annually that it remains only a question of time when this bay will become only the channel of South Heart river. In paddling a canoe over the bay at low water the bottom of the bay can be touched at from two to three feet and for a quarter of a mile from shore the water is not over six inches to a foot in depth. This low land at the mouth of South Heart river is very rich and grows great crops of hay besides

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 13—Continued.

pasturing hundreds of head of horses and cattle. There are dry elevations or low ridges and the banks of the old channels and other watercourses are thickly grown up with willow and towards the west side of the township several bluffs of poplar are found from two inches to ten inches in diameter, with some scattered spruce as large as fourteen inches in diameter. Peace River road leaves the road through the settlement at the east end of the Indian reserve (1500) and about a quarter of a mile westerly from this point the wagon road for Winakamu and Prairie Rivers settlement, branches southwesterly from Peace River road. Several of the lots have occupants, but there are none outside of the settlement survey at present. Many fields of oats, wheat and barley are seen which look very well though farming seems to be carried on in a half-hearted way yet, for the need of a better market. No rocks or quarries were discovered, and although there might be a good water-power on South Heart river by building a dam the opinion is given that it would be too great a risk to put one there on account of the sudden rise of the water at times. This township is essentially best suited for mixed farming and stock-raising. No game of any kind except a few partridge and rabbits were seen and one jumping deer south of South Heart river in the hay lands.—*Henry W. Selby, D.L.S., 1906.*

Range 16.

73. *East boundary.*—This line, with the exception of section 12 and part of section 13, passes through a thickly timbered country. Several spruce muskegs are crossed, but the north half of the township is covered with poplar and the land has a descent towards the north and is nearly dry. In the country lying along the 19th base line there is a large spruce muskeg very wet in places and a small quantity of large trees on the outer edge, but the average is quite small. East Prairie river crosses the line twice in the north half of section 12 and following a very crooked course passes out of the township in section 34. Land slides and the erosion of the banks by the water, have given the land adjoining the river an uneven appearance; one side frequently being only seven or eight feet high, while the other rises abruptly to a height of seventy-five or one hundred feet above the water. As seen from the west, north and east boundaries and from a walk south on the west side of the river, in sections 12 and 13 there are several prairie spots, the timber and brush having been burnt. My opinion would be that this township was not suitable for farming but would be more useful as a timber reserve.—*Henry W. Selby, D.L.S., 1906.*

74. A bird's-eye view of this township taken from any of the slight elevations around it, gives one the impression that it is covered with a dense growth of willow, large and heavy in places, which appears to conform to some regular but tortuous course while the smaller and less dense growth fills in the view. In fact the actual number of acres of prairie is very small compared with the whole. But the cleaning of the land with the willow upon it is a simple thing, and of the land not regularly flooded there should be very little that the average homesteader should object to on account of the brush. This township combines all the qualities for a settlement except a railroad to convey the produce capable of being grown therein to a market. People have been located there for some years, but they can use and dispose of only a limited quantity of grain, consequently many have not cultivated their land to any extent; but it is certainly suitable for grain growing or stock-raising. A little over four sections in the north end of the township may be called flooded land, but this will in the course of time become dry. From my observation the flooding of this place is caused by the stoppage of the water in the river by driftwood and log jams. I have seen a rise of six inches in the river above this land cause the water to flow over the sections from six to twelve inches deep for several days simply because the

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 16—Continued.

channel was so packed with logs and driftwood that it could not get through. Considerable dry timber for fuel can be got throughout the township, but once it begins to fill up with settlers they will be compelled to go south for their firewood. There is some timber in the south tier of sections but it is small and not standing very thick. Vegetation is generally very rank, stock looks well and a large quantity of hay is saved for winter feeding. The soil generally is a loose loam changing from black in the portion liable to flooding to a light loam or clay in those farther from the river. A good wagon road running from Lesser Slave lake to Sturgeon lake passes from east to west through this township and other roads branch off northerly for the use of settlers and to reach Slave lake without crossing so much water. East Prairie river follows a very crooked course with a general trend towards the north near the north end of the township, its channel is not much over half of the width it is in the south, but the current is more rapid. The greater part of the land is drained into East Prairie river through numerous coulées, some having small creeks in them at present, though most of them are dry. I am told that in some of these coulées at the time of high water in the river the water backs up several miles, and crops growing in fields adjoining them are benefited according to their proximity. No rocks or quarries were noticed, or game of any kind.—*Henry W. Selby, D.L.S., 1906.*

75. *Southwest six sections.*—For the present it was thought unnecessary to cut the lines through the balance of this township as much of it is flooded by East Prairie river. These six sections are nearly flat and are composed of prairie with large bunches of willow brush and willow fringed coulées. A quantity of black poplar and spruce is found on the north half of section 4. A sawmill is in operation about a half mile east of the east boundary of section 4 which has been supplied with spruce logs from the land adjacent to the river and its tributaries. This timber is of a good size, but is scattered. Two squatters have made improvements on section 6, but the amount of breaking is small all through this settlement, since the market is very limited. Much progress cannot be looked for without a railway.—*Henry W. Selby, D.L.S., 1906.*

7. The northern two-thirds of this township, with the exception of small portions south of the wagon road to Lesser Slave lake, is well suited for mixed farming and stock-raising. The soil is black loam on clay subsoil, and grass and vetches grow luxuriantly all over it except on the most heavily wooded sections, though not to the same extent that it does in parts of Prairie River settlement. There are two small creeks, one of which rises a short distance north of the base line in the high lands and flows in a coulée about twenty-five feet deep through section 32, where the coulée ends. The other rises in section 36 and flows through sections 35 and 27 in a coulée about twenty feet deep. From these points the coulées become simply rolling country and the creeks find their way to the low lands near Heart river. Many grassy sloughs which are nearly dry this year are found in sections 20, 21, 28 and 29. The settlement survey covers nearly all the prairie sections, but prairie is found sufficient for a good start on sections 16, 17, 18, 20, 21, 22, 27 and 28. On these the land is good, being clay, and black loam on clay subsoil, while the timber is small and not difficult to clear. Bluffs of poplar suitable for building purposes and fuel are on each of these. On the north half of section 17 a piece of breaking of about two acres is fenced, but no buildings have been built and there is no crop in yet. There is a house partially built in the southwest quarter of section 23, but no one resides there. In fact no one lives in this township except one settler on lot 110, one on 108 and one on lot 104, though there are crops growing on several of the settlement lots which the frosts of several cold nights do not appear to have injured. The chord four miles south of the base line runs through the low lands adjacent to Heart river, locally called Horse

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 16—Continued.

lakes when flooded. These basins or lakes were dry last year. In May of this year there was no water to be seen in them. In June the greater part of sections 8, 9, 10, 11 and 14 were covered to a depth of two to four feet of water after a rain of two days duration. In September very little water is to be seen in them. The reason for this flooding appears to be that East and West Prairie rivers flow into South Heart river in township 75, range 16. The quantity of water usually flowing in each of the Prairie rivers is about equal to that flowing in Heart river and the banks of Heart river being only about seven feet high cannot receive this extra flow of water. Consequently it has to overflow, some to the north of Heart river and some into basins south and along the Prairie rivers. This land not being at present suitable for farming or grazing I did not subdivide it. The heaviest timbered sections are 19, 30, 31, 32, 33, 34, 35 and 36; on these the timber is mainly poplar from two inches to twelve inches in diameter, with some willow. On the rest of the township the poplar is small and scattered and mixed with willow. A few trees of spruce and tamarack up to fourteen inches in diameter are seen on the south boundary of section 18 and along the west halves of sections 6 and 7, there are some good spruce and tamarack but only a small quantity and probably more useful for the needs of the settlers than for commercial purposes. No game was seen in this township but among the berry bushes tracks of bear were observed.—*Henry W. Selby, D.L.S., 1906.*

Range 17.

74. Before deciding as to the subdivision of township 74, range 17, after running the east and south outlines, I travelled over a large part of it and for the following reasons decided to subdivide only the east two miles for the present. The main reason being that there is more timber and brush west of Prairie river, than homesteaders care to locate on, until settlers become more numerous. And although in sections 18 to 14 and 19 to 23 there are numerous prairie spots and the grass and vegetation is quite rank and the soil all that could be desired, there are wet sloughs, coulées and some muskegs which make it look uninviting. The southerly third of the township west of the river falls gently towards the north and west, has poplar and willow all over it, and the soil is mostly a white clay with very little loam. The northerly third is more or less heavily timbered and flooded by the high water of West Prairie river, but as this does not often occur, this land may be suitable for stock-raising, but for the ordinary ranch where cattle and horses are supposed to rustle all winter, I do not think this part of the country will be suitable without providing hay for three months when the snow gets a crust on it. Sections 1 to 12 and the west parts of 26 and 35 are covered with poplar and willow and there is considerable willow and a few poplar bluffs scattered over the remainder of this part of the township, but there is not a quarter section of this latter part that has not enough prairie on it to give a settler a good start, as is evidenced by the number of claims already occupied. The peculiar feature of this part of the country is the large number of coulées or watercourses fringed with willow and scattered poplar, which now are nearly dry, but some have old beaver dams across them which hold the water back in ponds. These coulées or ravines appear to have been washed out by the water in the spring, made by the melting snow over an almost level surface, and they run in every direction, many flowing at right angles to others and beginning near others already formed. Some again, show their origin from springs or underground currents, since there is a small stream flowing at all times of the year and the banks of the coulées are constantly sliding in. This would not occur if it were only a watercourse. The vegetation on sections 2, 11, 14, 23, 25 and 36 is decidedly more rank than on the other sections, but from the information to be had it does not appear to be an advantage for where I have seen crops growing and the grass and weeds are not nearly so rank the yield of grain was greater.

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 17—Continued.

The soil where the vegetation grows rank seems more loose and spongy, while in the other case it is closer and more difficult to cultivate. This rank vegetation had to be cut down to get the lines through. Mr. F. Mearon, who has been on the south-east quarter of section 24 for the past three years, has thirty-five acres of land broken and under crop this season. It is well fenced and he has good log buildings, machinery necessary to work his farm with, ten head of horses and four head of cattle. He came there practically without anything, showing what industry and thrift ought to do on such soil. His crop this year is very good, some being so heavy as to lodge. Frost has not injured any of the crops in this township, the potatoes being green in the end of September. Vegetables of all kinds appear to do well and grow to an amazing size and quality. There are plenty of bear along West Prairie river and jumping deer were seen in the township and coyotes are very numerous.—*Henry W. Selby, D.L.S., 1906.*

75. In running the east outline of township 76, range 17, I found the sand hills and spruce muskeg to continue southwesterly to so great an extent and South Heart river and West Prairie river cutting in, several parts and places along these rivers subject to flooding and the land at present unfit for settlement, that I decided not to subdivide it. But when the east outline was run three settlers were found within the first mile west, with valuable improvements and farms of the best quality of soil. Consequently the survey of sections 1, 12, 13 and 24 was completed. The only portions of section 1 not suitable to farm are the two coulées which drain it, and through which spring creeks are running most of the year, furnishing water for the stock owned by the two settlers on the section. The coulées are therefore a benefit instead of otherwise. The crop of oats, wheat and barley grown by Joseph Ferguson on the northeast quarter of section 1 is excellent and when the land is properly worked will greatly improve as the soil is a rich loam on clay subsoil. Grass grows very rank and with it thick masses of vetch and peavine. The settlers can go almost anywhere on the prairie and put up from three to five loads per acre, while stock destroys more than they eat. The water found in the coulées has in most cases an iron or alkaline taste but the well water after being used for a while becomes free from this mineral taste. Many frosty nights have occurred this season, but little or no damage has been done and that little only in case of grain sown late. Garden produce such as potatoes, cabbage, beets, turnips, carrots and lettuce have developed to a perfect state. One has only to observe the condition of the horses, cattle, pigs, &c., to arrive at an opinion as to the rich quality of the soil and its produce. Sections 12 and 13 are equally good as section 1 except that more willow brush is found growing along and between the various watercourses, but the quality of the soil and vegetation would indicate their fitness for farming purposes. A very imperfectly farmed field of oats put in by A. McDonald on these sections has been cut and although not threshed the turnout promises exceedingly well. Section 24 is somewhat cut up by South Heart river and the land adjacent to it is more or less flooded and cut into by the water when the floods subside, but the east half has very little land on it that cannot be farmed and the west half will do for grazing or hay when the brush and timber is cut. The first road into the settlement from the north was opened through this section, being free from danger of flooding from the rise of the water in the rivers.—*Henry W. Selby, D.L.S., 1906.*

Range 19.

64. *North outline.*—In section 34 the line intersects, seven times, Atikkamek ('poisson blanc') creek, a tributary to Atimsegun ('dog's tail') river. This river, after crossing the line near the northeast corner of section 31, flows northwest into

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 19—Continued.

Little Smoky river. The country is flat and swampy in many places. The high land is wooded with spruce six to twenty-four inches in diameter, poplar six to fifteen inches and jackpine five to ten inches, also birch, balsam and fir, while in the swamps there is tamarack six to twenty inches in diameter. The soil is black loam four to eight inches deep with a clay subsoil. The Lake St. Ann pack trail (southern one) to Sturgeon lake passes close to the northeast corner of section 33.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 20.

64. *North outline.*—This township has a gently rolling and wooded surface; there are some tamarack swamps with timber eight to fifteen inches in diameter. The divide between Atimsegun and Little Smoky rivers is in section 31 (altitude 2,350 feet above sea level). Through section 34, flows a creek which empties into lake Giroux whose eastern extremity lies three-quarters of a mile north of the line. This lake is about three miles long by one mile and a half wide, and lies in a northwesterly direction. North of it the land is high and supports a good growth of poplar and spruce, but to the west it appears to be low and swampy. The soil is black loam, four to six inches deep with a clay subsoil. An old pack trail leading north crosses the line in section 35.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 21.

64. (*North outline.*)—This township is heavily timbered with spruce ten to thirty inches, jackpine six to twelve inches, and poplar, balsam, fir, birch and tamarack six to ten inches in diameter. Its surface is undulating except in section 33, where steep hills lead down to Little Smoky river (2,050 feet above sea level). This stream, which flows from the southeast, crosses the north boundary of this section three times. It is three chains and a half wide, has a swift current running over a stony bottom, and has high cut banks. It is not navigable. Its valley, which is two hundred feet deep, is about one mile wide between the crests of the hills which bound it on each side. The pack trail (southern one) between Lake St. Ann and Sturgeon lake, passes through section 35, east of Little Smoky river. The soil is a black loam with a clay subsoil; it changes to a sandy loam over a mixture of sand and clay in the valley of Little Smoky river. A few stones were seen on the surface in places. The land west of the river is high, rolling and covered with bad windfall. It is wooded with spruce from ten to thirty inches in diameter, balsam, fir and cottonwood with heavy undergrowth of alders. The soil is a black loam two to six inches deep, over a subsoil of clay mixed with stones or coarse gravel. The general slope of the country is towards the northwest.—*Arthur Saint Cyr, D.L.S., 1906*

80. *North outline.*—The surface is undulating and is well wooded. A hay marsh half a mile long lies one-quarter of a mile south of the base line in section 31. Small streams, tributaries to North Heart river, cross the line in sections 34 and 35. In sections 31 and 32 the subsoil is clay mixed with gravel and stones. In the rest of the range the soil is blue clay covered by a few inches of loam. Throughout this township there are many willow swamps. An Indian pack trail from 'Little Prairie' crosses the line in section 34. Smoky river and the country east of it is now accessible by a wide road which I had to cut in order to reach the initial point of my survey.—*Arthur Saint Cyr, D.L.S., 1906.*

84. Peace river flows from south to north across this township and crosses its north boundary in the middle of section 33. The river is here half a mile wide. From the river the land rises gradually till at one and a half and three-quarters of

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 21—Continued.

a mile from the right and left banks respectively it reaches an altitude of 700 feet. Across the line and close to the right bank lies an island wooded with cottonwood and spruce. East of the river the country is covered with young poplar, willows and alders and broken by deep ravines. Solid timber begins half a mile south of the line and extends southerly to Peace River Landing. The soil is light in the vicinity of the river.—*Arthur Saint Cyr, D.L.S., 1906.*

84. *North outline.*—Peace river flows from south to north across this township and crosses the north boundary in the middle of section 33. The river is here half a mile wide. From the river the land rises gradually till, at three-quarters of a mile from the left bank, it reaches an altitude of seven hundred feet. Across the line, and close to the right bank, lies an island wooded with cottonwood and spruce. East of the river the country is broken by deep ravines and is covered with young poplar and willow and alder scrub. Solid timber begins half a mile south of the line, and extends southerly to Peace River Landing. The soil is light in the vicinity of the river. Where the line intersects the right bank of Peace river I noticed an outcrop of sand stone fifty feet in height. This outcrop extends for a considerable distance on either side of the line. Lying close to the right bank of the river there are also, in this vicinity, many islands, all wooded with cottonwood and black poplar. The middle of township 68, range 21, includes the valley of Peace river, which flows through this township from south to north. This township is consequently much cut by deep and wide gulches, separated by some narrow bench land. The soil in one-half of section 33 and the whole of section 34 is poor. In the other two sections it is a black loam four to eight inches deep, with a clay subsoil. The land is covered with small poplar and willow scrub.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 22.

80. *North outline.*—The height of land between the Smoky and North Heart rivers occurs in section 34. West of this divide, in sections 31, 32 and 33, are many large hay marshes, while east of it the ground slopes gently towards the valley of North Heart river. The land in this range also is wooded with poplar six to ten inches in diameter. There are many willow swamps. The soil is the same as in range 23.—*Arthur Saint Cyr, D.L.S., 1906.*

84. The country is rolling, covered by bad windfall. A pack-trail leading to the Roman Catholic mission crosses the line in the middle of section 34. There is a large hay marsh in section 33 and an extensive muskeg in section 32. The soil is a black loam 2 to 8 inches deep overlying a clay or gravelly clay subsoil.—*Arthur Saint Cyr, D.L.S., 1906.*

84. *North outline.*—The surface is rolling, and is covered by heavy windfall. A pack-trail leading to the Roman Catholic mission crosses the line in the middle of section 34. There is a large hay marsh in section 33, and an extensive muskeg in section 32. The soil is a black loam from two to eight inches deep with a clay or gravelly subsoil.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 23.

80. *North outline.*—Smoky river flows northerly through the middle of this township, and crosses the north boundary a short distance west of the northeast corner of section 33. At this point the river is three hundred and thirty yards wide, and has a swift current flowing over a stony bottom. Precipitous hills rise to a height of seven hundred feet on both sides of this stream whose valley is one mile and a quarter wide.

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 23—Continued.

With the exception of the immediate vicinity of the river, where the land is much broken by deep ravines, high mud banks and land slides, the country is either level or undulating and supports a thick growth of poplar, spruce, birch and cottonwood with heavy undergrowth. The soil is a few inches of loam over a clay subsoil.—*Arthur Saint Cyr, D.L.S., 1906.*

84. The outlet of Bear lake flows northerly through section 32. The land is swampy for some distance on each side of this stream which is a tributary of Whitemud river. Another stream flowing southeast is crossed in section 36. On the swampy land found in this vicinity a limited quantity of hay could be cut. A wagon road leading to Chas. St. Germain, a settler living at the Peace river, has been cut along this creek as far as the base line. The last mentioned creek is reported to head from two small lakes lying four miles north of the line.—*Arthur Saint Cyr, D.L.S., 1906.*

84. *North outline.*—The outlet of Bear lake, which is a tributary of Whitemud river, flows northerly through section 32. The land is swampy for some distance on each side of this stream. Another stream, flowing southeast, is crossed in section 36. On the swampy land, found in the vicinity, a limited quantity of hay could be cut. A wagon road, leading to the place of Chas. St. Germain, a settler living near Peace river, has been cut along this creek as far as the base line. This last mentioned creek is reported to have its source in two small lakes lying four miles north of the line.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 24.

80. *North outline.*—The surface is undulating and is wooded with poplar, birch, cottonwood and some spruce from five to fifteen inches in diameter. The soil is a black loam, two to five inches deep over a clay subsoil. There are many small willow swamps and a large muskeg extends north of section 33. A small creek flowing northerly, intersects the north boundary of section 32.—*Arthur Saint Cyr, D.L.S., 1906.*

84. The surface of this township is undulating, stony and swampy in places and covered with windfall. The soil is a black loam 2 to 6 inches deep; the subsoil is clay. All the timber has been destroyed by fire. A creek coming from the northwest crosses the base line near the corner of section 32. Through the middle of section 36 runs an Indian trail, leading to Bear lake. The eastern extremity of Whitemud hill is in section 35.—*Arthur Saint Cyr, D.L.S., 1906.*

84. *North outline.*—The surface of this township is undulating, is swampy in places, and is covered with windfall. The soil is a black loam two to six inches deep, with a subsoil of clay and is, in places, stony. All the timber has been destroyed by fire. A creek, coming from the northwest, crosses the base line near the northeast corner of section 32. Through the middle of section 36, runs an Indian trail, leading to Bear lake. The eastern extremity of Whitemud hills is in section 35.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 25.

84. The north boundary of this township runs over the south slopes of the Whitemud hills, where all the timber was a few years ago destroyed by fire. The land which is stony in places is high rolling and supports a second growth of poplar with willows and alders. The soil consists of a few inches of loam overlying a subsoil of clay. A large creek running south crosses the base line at the corner of section 32 and flows into the west end of Bear lake. A well defined pack trail follows along the east bank of the stream and leads to the south shore of Bear lake, where it joins the

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TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 25—Continued.

wagon road to Brick's settlement, on Peace river. Other small streams also cross the line in every section, all flowing into Bear lake.—*Arthur Saint Cyr, D.L.S., 1906.*

84. *North outline.*—The north boundary of this township runs over the south slope of the Whitemud hills, where all the timber was a few years ago destroyed by fire. The surface is high rolling and the land which is stony in places is covered with willow and alder scrub and second growth poplar. The soil consists of a few inches of loam over a clay subsoil. A large creek running south crosses the base line at the northeast corner of section 32, and flows into the west end of Bear lake. A well defined pack trail follows along the east bank of this stream, and leads to the south shore of Bear lake, where it joins the wagon road to Brick's settlement on Peace river. Other small streams also cross the line in every section, all flowing into Bear lake.—*Arthur Saint Cyr, D.L.S., 1906.*

Range 26.

84. This is a fractional township adjoining the sixth meridian which intersects its north boundary at 65.19 chains west of the corner of section 35. The country in the vicinity is gently rolling and covered with a second growth of poplar with willows and alders. Considerable dead timber is lying on the ground; green timber of small diameter is found only in clumps scattered here and there. The soil is a black loam 2 to 10 inches deep; the subsoil is clay. A creek flowing to the south crosses the line in section 35. Stones were noticed on the surface.—*Arthur Saint Cyr, D.L.S., 1906.*

84. *North outline.*—This is a fractional township. The sixth meridian intersects its north boundary 65.19 chains west of the northeast corner of section 35. The country in this vicinity is gently rolling and is covered with windfall, willow and alder scrub and second growth poplar. Green timber, of small diameter, is found only in clumps scattered here and there. The soil is a black loam two to ten inches deep with a subsoil of clay. A creek flowing to the south crosses the line in section 35. Stones were noticed on the surface in places.—*Arthur Saint Cyr, D.L.S., 1906.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 24.

18. I ran a part of the north boundary of section 31 and the west boundaries of sections 31 and 30 and traversed the right bank of Thompson river through these sections. The land surveyed in this township is open, hilly, rocky and broken and only fitted for grazing purposes. I was told that there are some gypsum deposits of some value here. Some tunnelling and development work had been done on the southeast quarter of section 36 and the northeast quarter of section 25, township 18, range 25, west of the sixth meridian. I did not make any examination of the work done. The surface indications point to the bulk of the mineral as lying in the two last mentioned quarter sections.—*Jos. E. Ross, D.L.S., 1906.*

20. I ran the north boundary of section 8 and the part of north boundary of section 7 lying east of Thompson river. The part surveyed is open and hilly. There is some bench land which could be cultivated. It would need to be irrigated. I understand that the Canadian Pacific Railway company object to the land here being irrigated, as it causes the high banks along the railway to slide out.—*Jos. E. Ross, D.L.S., 1906.*

